APPENDIX A

Previous Data

ATTACHMENT A.1 – Logs of Borings by Berloger, Long and Associates (1981)

ATTACHMENT A.2 – Logs of Borings by Porter, Urqhart, McCreary, and O'Brien Consultants (1958)

APPENDIX A

DATA REVIEW

Stevens Creek Levee Recertification
Mountain View, California

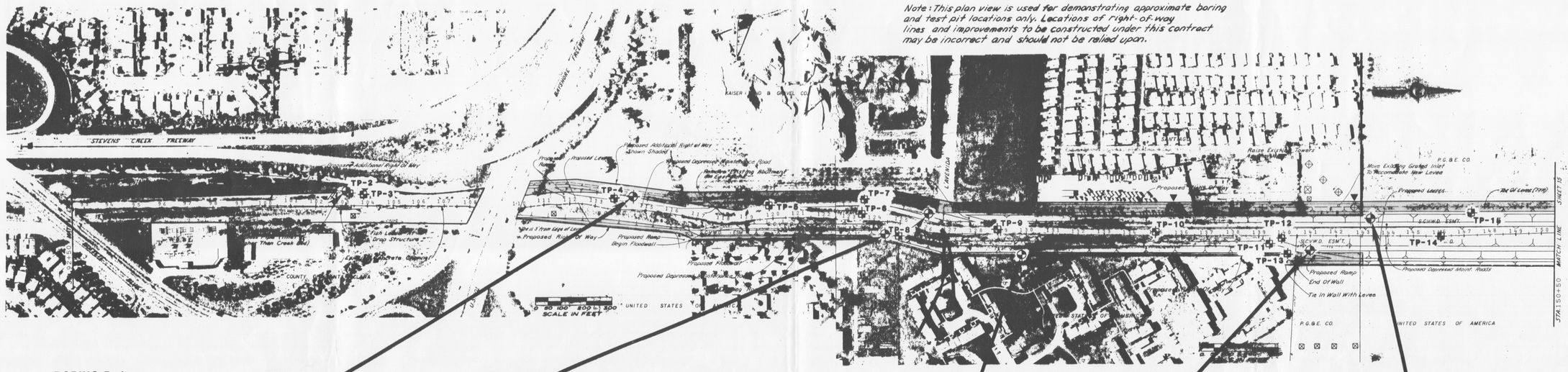
As part of our evaluation of subsurface conditions for the subject levees, AMEC compiled and reviewed geologic and geotechnical information in the vicinity of the subject levees contained in our files and the archives of the Santa Clara Valley Water District. The site map and boring logs from relevant previous subsurface investigations are provided for reference and included in this appendix. The locations or previous explorations are also indicated on Figures 2, 3, and 4 of this report.

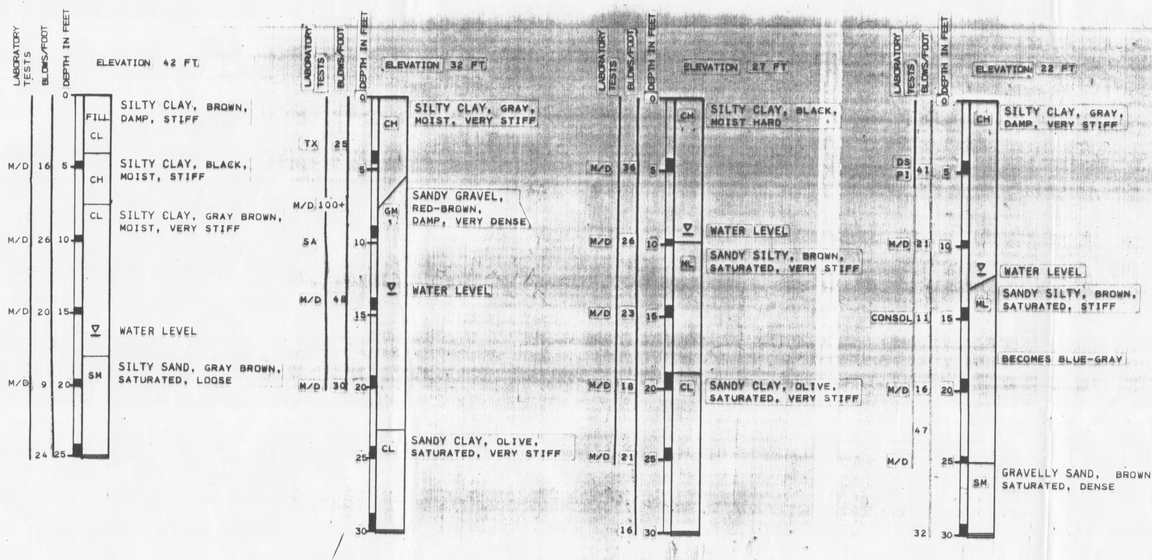
It should be noted that the files we reviewed may not include all the geologic/geotechnical investigation reports prepared for projects in the vicinity of the subject levees. In addition, this report does not include all the information for the study area that is available in the archives reviewed by AMEC. Only the information we judged to be most pertinent to the present study is included in this appendix.

Because the information presented in this appendix does not completely describe the evaluation and exploration techniques used or the subsurface and groundwater conditions encountered, the reader may want to review the original reports from which the information was excerpted. The logs included in this appendix should be considered to depict subsurface conditions only at the specific locations and at particular times the exploration work was performed and/or water levels were measured. Soil and groundwater conditions at other locations may differ from the conditions occurring at these locations. Also, the passage of time may result in changes in the soil and groundwater conditions at these locations.

ATTACHMENT A.1

Logs of Borings by Berloger, Long and Associates (1981)





BORING LOCATION

TEST PIT LOCATION

RECORD DRAWING
PROJECT SUPERVISOR
BY Dan Arroyo
DATE 2/22/83

REV	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

1. UNIFIED SOIL CLASSIFICATION SYSTEM IS EXPLAINED ON PLATE 5 OF THE SOILS REPORT.
2. KEY TO BORING LOGS AND LABORATORY TESTS ARE EXPLAINED ON PLATE 6 OF THE SOILS REPORT.
3. BORING ELEVATIONS ESTIMATED BY INTERPOLATING BETWEEN GROUND ELEVATIONS SHOWN ON THE PROJECT PROFILE PLAN.

SOIL INVESTIGATIONS BY
BERLOGAR, LONG & ASSOC.
2468 EMBARCADERO WAY
PALO ALTO, CALIF. 94303

DATE 7/81
DESIGN
DRAWN
CHECKED J.P

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER R.C.E. No. 19214

ENGINEERING APPROVAL 3-1-82
DIVISION ENGINEER R.C.E. No. 18750

STEVENS CREEK
HWY 101 TO SHORELINE PARK
LOG OF SOIL BORINGS

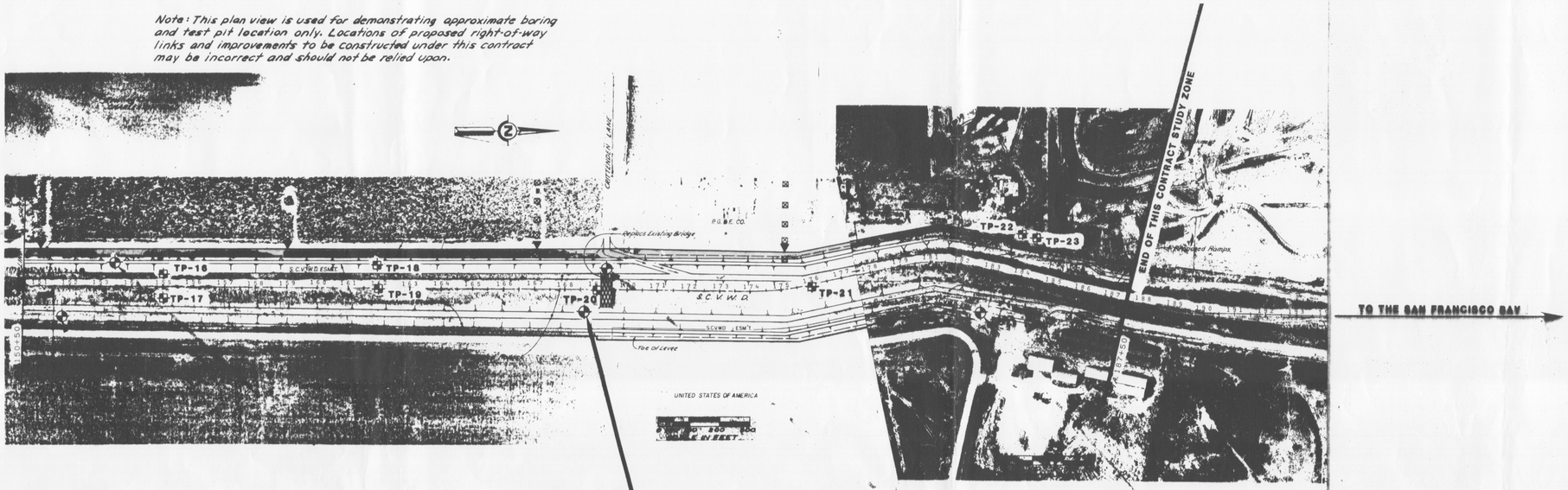
SCALE 1"=200'
SHEET 25 OF 45

JOB NUMBER: 915-40
BY: LDL/BR
10 2 9
11858

Stevens Creek - Bore Logs

A.1-2

Note: This plan view is used for demonstrating approximate boring and test pit location only. Locations of proposed right-of-way links and improvements to be constructed under this contract may be incorrect and should not be relied upon.



BORING B-8

ELEVATION 14 FT

CURVE	LABORATORY TESTS	BLOWS/FOOT	DEPTH IN FEET		
			0	FILL	SILTY SAND, RED-BROWN, DAMP, MEDIUM DENSE
	M/D	26	5	SM	
				CL	SANDY CLAY, YELLOW-BROWN, MOIST, STIFF
	M/D UC	22	10	▽	WATER LEVEL
				CL	
	M/D	7	15		SANDY CLAY, BROWN, SATURATED, STIFF
	M/D	8	20		
		11	25	SP	GRAVELLY SAND, RED-BROWN, SATURATED, MEDIUM DENSE
		80	30		

BORING B-9

ELEVATION 15 FT

LABORATORY TESTS	BLOWS/FOOT	DEPTH IN FEET		
		0	FILL	GRAVELLY SILTY SAND, DAMP, MEDIUM DENSE
M/D	23	5	SM CL	
			SM	SILTY GRAVELLY SAND, BROWN, MOIST, MEDIUM DENSE
M/D	15	10	SM	SILTY SAND, LIGHT BROWN, WET, MEDIUM DENSE
			▽	WATER LEVEL
	17	15		
			CL	SANDY CLAY, RED-BROWN, SATURATED, STIFF
	15	20		
	17	25		
	20	30		

BORING B-10

ELEVATION 4 FT

LABORATORY TESTS	BLOWS/FOOT	DEPTH IN FEET		
		0	FILL	SILTY GRAVEL, BROWN, DAMP, MEDIUM DENSE
			GM	
			CH	SILTY CLAY, BLACK, MOIST, SOFT
M/D	24	5	▽	WATER LEVEL
			GM	SANDY GRAVEL, BROWN,
M/D	27	10		SATURATED, MEDIUM DENSE
			SM/CL	SILTY SAND, BROWN
M/D	13	15		SILTY CLAY, RED-BROWN,
			CL	SATURATED, STIFF
M/D	80	20		
	26	25		
				SILTY SAND, GRAY,
M/D	37	30	SM	SATURATED, DENSE
			GP	SANDY GRAVEL
			ML	SANDY CLAYEY SILT, MOTTLED RED-BROWN,
	56	35		WET, HARD
M/D	100+	40		

BORING B-11

ELEVATION 17 FT

LABORATORY TESTS	BLOWS/FOOT	DEPTH IN FEET		
		0	FILL	GRAVELLY CLAY, DARK BROWN, MOIST, STIFF
		12	CL	
M/D TX	23	5		
	16			
			SM	SILTY GRAVELLY SAND,
M/D TX	28	10		GRAY, MEDIUM DENSE
			CH	SILTY CLAY, BLACK
				MOIST, STIFF
			▽	WATER LEVEL
DS	16	15	SM	CLAYEY SAND, GRAY,
				SATURATED, MEDIUM DENSE
			CL	SILTY CLAY, MOTTLED
UC	20	20		RED-BROWN, WET, VERY STIFF
	27	25		
	35	30		
	37	35		
	31	40		

BORING B-12

ELEVATION 2 FT

LABORATORY TESTS	BLOWS/FOOT	DEPTH IN FEET		
		0	ML	SANDY SILT, DARK BROWN, MOIST, MEDIUM STIFF
M/D TX	18	5	CH	SILTY CLAY, BLACK, WET, STIFF
			▽	WATER LEVEL
M/D	14	10	SM	SILTY SAND, GRAY-BROWN
			CH	SILTY CLAY, MOTTLED RED-BROWN, SATURATED, STIFF TO HARD
	47	15		
M/D	69	20	CL	SILTY CLAY, MOTTLED RED-BROWN, SATURATED, HARD
	57	25		
M/D	99	30		
	16	35	ML	SANDY CLAYEY SILT, BROWN, SATURATED, STIFF
M/D	41	40	SM	SILTY SAND, BROWN, SATURATED, VERY DENSE
	64	45	SP	SILTY SAND, GRAY BROWN, SATURATED, VERY DENSE
		46.5		

BORING LOCATION

TEST PIT LOCATION

RECORD DRAWING
PROJECT SUPERVISOR
BY Dean Arroyo
DATE 2/22/83

REV	DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

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2488 EMBARCADERO WAY
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DATE 7/81
DESIGN
DRAWN
CHECKED J.P

Santa Clara Valley Water District

ENGINEERING CERTIFICATION
PROJECT ENGINEER R.C.E. No. 19214

ENGINEERING APPROVAL 2-1-82
DIVISION ENGINEER R.C.E. No. 18759

STEVENS CREEK
HWY 101 TO SHORELINE PARK
LOG OF SOIL BORINGS

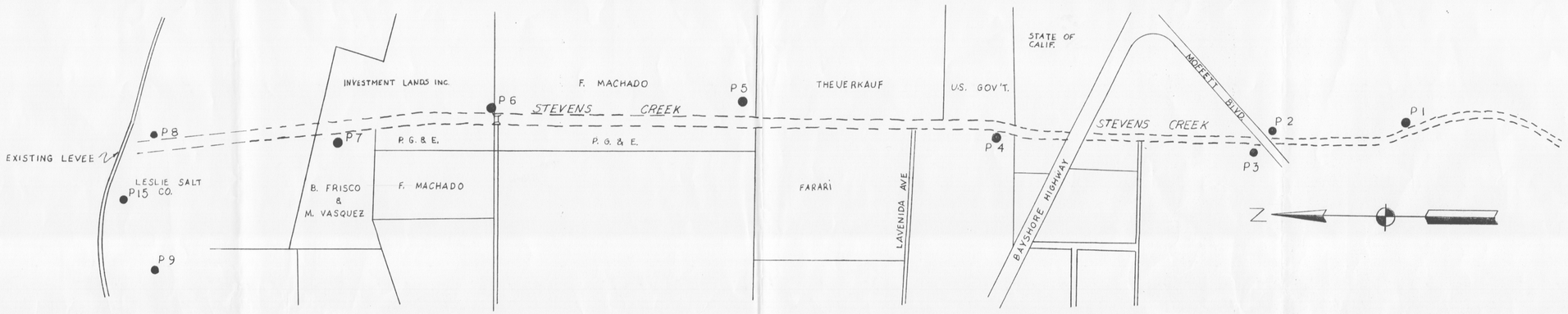
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SHEET 26 OF 45

1029

A.1-3

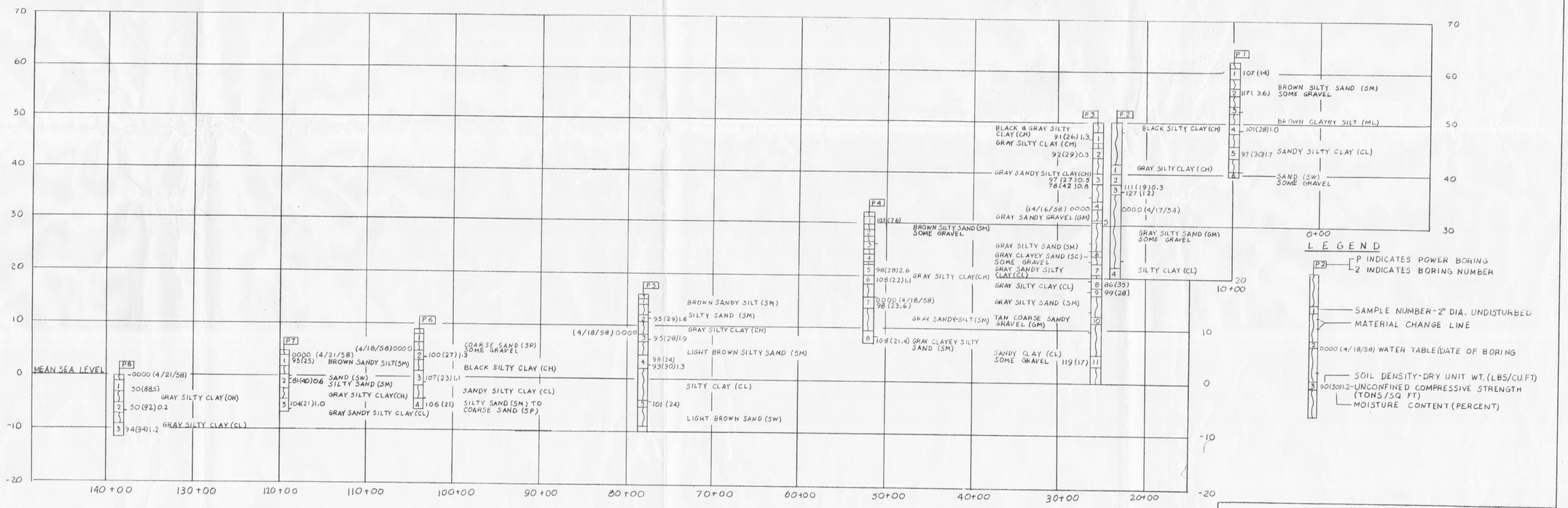
ATTACHMENT A.2

Logs of Borings by Porter, Urqhart, McCreary, and O'Brien Consultants (1958)



BORING LOCATION PLAN

SCALE - 1" = 600'



SOIL PROFILE

SCALE = HOR. 1" = 600'
= VERT. 1" = 10'

NOTE: ZERO DATUM - MEAN SEA LEVEL U.S.G.S.

BORING LOG

SAMPLES TAKEN AND TESTS BY PORTER, URQHART, McCREARY & O'BRIEN, CONSULTANTS

LEGEND

P2 — P INDICATES POWER BORING, 2 INDICATES BORING NUMBER

SAMPLE NUMBER - 2" DIA. UNDISTURBED

MATERIAL CHANGE LINE

0000 (4/18/58) WATER TABLE (DATE OF BORING)

90(30)1.2 — SOIL DENSITY - DRY UNIT WT. (LBS/CU.FT), UNCONFINED COMPRESSIVE STRENGTH (TONS/SQ FT), MOISTURE CONTENT (PERCENT)

AS BUILT

Project Supervisor

By_____

Date_____

DETAILS
ZONE NW-1 (NORTH WEST) PROJECT 1
STEVENS CREEK IMPROVEMENT

SANTA CLARA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ENGINEERING APPROVAL

George H. Prime

GEORGE H. PRIME SUPERVISING ENGINEER

APPROVED FOR DEPT. OF PUBLIC WORKS:

James B. Enochs

JAMES B. ENOCHS DIRECTOR

DESIGN AUM&O		SCALE: AS SHOWN	
DRAWN HS	T.B. NONE	JOB NO.	
CHECKED CLL	L.B. NONE	SHEET 22 OF 48	
DATE 6-16-60	FILE NO. 8096		

4537

A.2-2

APPENDIX B

Field Reconnaissance Memorandum

Memo

TO:	Chuck Anderson/S&W	**DATE:**	February 24, 2009
FROM:	David Ritzman Jim French	**PROJ. NO.:**	13815.002.0
CC:	Liza McNulty/S&W Beeson Liang/PGE	**PROJ. NAME:**	Stevens Creek Levee Recertification
SUBJECT:	**Summary of Geotechnical Field Reconnaissance – Stevens Creek Levees, Mountain View, California**		

INTRODUCTION

The Santa Clara Valley Water District (District) has initiated a project to evaluate and recertify District-owned levees in accordance with Federal Emergency Management Agency (FEMA) flood mapping standards. To qualify for recertification, the levees must be shown to conform to the requirements of Title 44 of the Code of Federal Regulations (44 CFR), Section 65.10, which includes minimum certification standards for levee design, operations, and maintenance.

The District has retained Schaaf & Wheeler (S&W), with AMEC Geomatrix, Inc. (AMEC; formerly known as Geomatrix Consultants, Inc.) and Pacific Geotechnical Engineering (PGE) as geotechnical subconsultants, to perform topographic surveying, geotechnical exploration, laboratory testing, and hydraulic and engineering analyses, calculations, and evaluations necessary to recertify levees along the east and west banks of Stevens Creek between Highway 101 and Crittenden Lane in Mountain View, California. Upon completion of these efforts, certification documents will be prepared by S&W and submitted to FEMA by the District for accreditation and incorporation of the levees into appropriate Flood Insurance Rate Maps (FIRMs).

As an initial step in the recertification process, AMEC reviewed available information and performed geotechnical field reconnaissance of the Stevens Creek levees. The purpose of the reconnaissance was to observe levee conditions and identify areas for further investigation and study. Reconnaissance efforts were primarily focused on identifying geotechnical issues of concern, including potential settlement, slope instability, and seepage problems. However, other related considerations also were observed and documented as part of the reconnaissance, including the presence and condition of closures and penetrations; erosion; encroachments by vegetation, utilities, and structures; and maintenance considerations.

This technical memorandum presents the findings of AMEC's field reconnaissance and discusses key observations, geotechnical issues of concern, and other issues of potential concern related to the proposed recertification of the Stevens Creek east and west bank levees between Highway 101 and Crittenden Lane. This memorandum also identifies areas and conditions that require further investigation and/or study and suggests possible maintenance solutions that may be implemented to mitigate potential problems encountered during the reconnaissance.

AMEC Geomatrix, Inc.
2101 Webster Street, 12th Floor
Oakland, California
USA 94612-3066
Tel (510) 663-4100
Fax (510) 663-4141
www.amecgeomatrixinc.com

AMEC Geomatrix

RECONNAISSANCE ACTIVITIES

Field reconnaissance of levees along the east and west banks of Stevens Creek was performed by Mr. David Ritzman (California GE #2710), a Senior Engineer with AMEC, on May 28, 29, and 30 and June 2, 2008. Reconnaissance activities included the following:

- visually observing the levees, creek channel, and adjacent areas for evidence of settlement, erosion, ground deformation/cracking, and potential stability problems
- approximately measuring levee dimensions and slope inclinations
- identifying the presence and condition of erosion protection measures, outfalls, closures, floodwalls, and other structures and improvements along the levee alignments
- identifying trees, utilities, and other features that encroach on levee slopes
- observing water levels and flow conditions in the creek channel
- photographing the levees, adjacent areas, and other features of interest
- locating utilities, penetrations, and other features of interest using handheld Global Positioning System (GPS) equipment

Conditions observed during the field reconnaissance were documented in levee field reconnaissance logs, copies of which are included as Attachment 1 to this memorandum. The field logs also include references to approximate project stationing, as well as brief descriptions of photographs and GPS locations collected during the reconnaissance effort. Photographs, along with accompanying descriptions and location references, are presented in Attachment 2. GPS locations and feature descriptions are presented in Attachment 3.

Locations of observations, photographs, and other features described in the field reconnaissance logs and in this memorandum are referenced to the District's levee stationing system. Aerial photographs of the levees, along with the District's stationing line, are shown on Figures 1, 2, and 3. In the field, positions relative to the stationing line were estimated based on the locations of features visible on the aerial photographs. Distances were measured using a measuring wheel. Because of the inexact nature of these methods and measurements, references to District stationing presented in the field reconnaissance logs and this memorandum should be considered approximate.

LEVEE DESCRIPTION

As shown on Figures 1, 2, and 3, levees along the east and west banks of Stevens Creek between Highway 101 and the Crittenden Lane Bridge are approximately 5,900 feet (1.1 miles) long. Although portions of the two levees were originally constructed prior to 1978, the levees were relocated, raised, and widened by the District in the early 1980s as part of a levee improvement project. In addition to constructing new levees, the improvement project included dredging and shaping the creek channel, constructing a flood wall on a portion of the east side

of the creek, and raising the Crittenden Lane Bridge by approximately 10 feet to allow additional flow capacity (Berlogar, 1981).

East Bank Levee

The east bank levee study area begins at the downstream end of a rectangular box culvert beneath Highway 101, near Station 110+40 (District stationing), and extends downstream to the Crittenden Lane Bridge, near Station 169+50. Between Stations 126+80 and 142+50, the levee is replaced by a concrete flood wall that ranges from approximately 1 to 8 feet in height above the ground surface on the outboard side of the wall.

For convenience in documenting observations during our field reconnaissance, the east bank levee was divided into five reaches, each with relatively uniform geometry and configuration. The five reaches, designated E-1 through E-5, range from approximately 400 to approximately 2,700 feet in length. Table 1 summarizes the location and general characteristics of each reach. More detailed reach descriptions are provided in the field reconnaissance logs (Attachment 1).

As noted in Table 1, Reach E-3 (between Stations 120+00 and 126+80) may not qualify as a levee: along this reach, the ground surface on the outboard side of the stream bank is generally at an elevation near or slightly lower than the elevation of the access road that runs along the top of the bank; there is no well-defined levee “toe” on the outboard side of the access road.

West Bank Levee

The west bank levee study area also begins at the downstream end of the rectangular box culvert beneath Highway 101, near Station 111+00, and extends downstream to the Crittenden Lane Bridge, near Station 169+50. Similar to the east bank levee, the west bank levee was divided into five reaches, designated W-1 through W-5, which range from approximately 250 to 2,650 feet in length. Table 1 summarizes the location and general characteristics of each reach. More detailed reach descriptions are provided in the field reconnaissance logs (Attachment 1).

As noted in Table 1, portions of Reach W-3 (between Stations 120+00 and 130+30) may not qualify as a levee: along this reach, the ground surface on the outboard side of the stream bank is generally obscured by heavy vegetation but appears to be at an elevation near the elevation of a pedestrian/bicycle trail that runs along the crest of the inboard stream bank/levee slope; along much of the reach there is no well-defined levee “toe” on the outboard side of the trail.

KEY OBSERVATIONS

During our field reconnaissance, each levee reach was visually screened for the following conditions:

- evidence of settlement (i.e., surface cracks, sinkholes, and hummocky/undulating ground)

- erosion (i.e., rills, gullies, scour around structures, and undercut or oversteepened levee and stream bank slopes)
- evidence of potential slope stability problems (i.e., steep and/or undercut slopes, surface cracks, and caving, bulging, slumping, or irregular ground surfaces)
- other ground deformation and/or cracking not obviously related to settlement, erosion or slope instability
- encroachments by vegetation or other improvements
- inadequate maintenance (i.e., mowing/vegetation control, debris/blockages in the channel, inoperable control structures, etc.)
- evidence of potential problems with walls, abutments, weirs, aprons, and other structures within the levee and channel area
- evidence of seepage (e.g., wetland-type vegetation, moist or wet ground, springs and/or boils on the outboard side of the levee)
- damaged, distressed, and/or blocked closures or interior drainage structures, including gates, flaps, and other devices for backflow control
- adverse channel conditions (i.e., blockages, excessive debris, sand/gravel bars, etc.)
- animal burrows

Where the above conditions were observed, the type, location, and severity of the condition were noted in the field reconnaissance logs. Observed conditions were subjectively assigned one of five severity levels: (1) slight, (2) slight to moderate, (3) moderate, (4) moderate to severe, and (5) severe. Each reach was screened for all of the above conditions; if a particular condition is not noted in the reach's reconnaissance log, it was not observed in the field.

Table 2 summarizes key observations made along each levee reach during the site reconnaissance. As shown in Table 2, key observations apply to one or more of the conditions described above. The severity of each condition as it relates to the observation is also presented in Table 2.

GEOTECHNICAL ISSUES OF POTENTIAL CONCERN

Geotechnical issues pertaining to levee certification include embankment and foundation stability, seepage, and settlement. For certification under FEMA standards, the following conditions must be demonstrated:

- Levee embankment and foundation stability will not be jeopardized under anticipated seepage and loading conditions associated with the base (i.e., the one-percent-annual-chance, or "100-year") flood.

- Embankment and foundation stability will not be jeopardized under anticipated seismic loading conditions.
- Potential settlement of the levee embankment will not cause the amount of freeboard to fall below required minimum values.

For existing levees, recertification efforts could be jeopardized by conditions that exhibit evidence of or indicate the potential for embankment and foundation instability, adverse seepage conditions, and/or excessive settlement.

In our opinion, the levee and channel conditions observed during field reconnaissance of the Stevens Creek east and west bank levees do not generally indicate serious geotechnical problems that could jeopardize potential levee recertification. However, a number of minor geotechnical issues of potential concern were noted during the reconnaissance. This section discusses conditions observed along the Stevens Creek levees that directly and indirectly relate to stability, seepage, and settlement. Recommended approaches for additional investigation, study, and maintenance in these areas are also described, as appropriate.

Recent Sliding of Stream Bank Slopes

During our field reconnaissance, evidence of relatively recent sliding of the stream bank slope was observed along the east side of Stevens Creek between Stations 121+00 and 123+00. The observed instability in this area is shallow in nature and appears to result from stream erosion at the toe of the slope. Where affected by recent sliding, the stream bank slope is very steep, with inclinations ranging from about 1:1 (horizontal:vertical) to near vertical in some areas.

It is unclear from observations made during our field reconnaissance whether the conditions at the top of the stream bank slope in this area constitute a jurisdictional levee. The ground surface on the outboard side of the stream bank is generally at an elevation near or slightly lower than the elevation of the access road that runs along the top of the bank. There also is no well-defined levee “toe” on the outboard side of the access road. As a result, instability of the stream bank in this area may not have a significant effect on potential flooding hazards or be relevant to levee recertification efforts.

Further study of topographic and hydraulic conditions within and adjacent to the stream channel should be performed to determine whether a jurisdictional levee exists at the top of the stream bank slope in this area. Subsurface exploration and laboratory testing should be performed to identify and characterize soil and groundwater conditions beneath the existing stream bank slope and access road. If the existing stream bank configuration is found to be a jurisdictional levee, the stability of the stream bank slope should be evaluated in accordance with FEMA standards.

Steep Levee and Stream Bank Slopes

Relatively steep levee and stream bank slopes present potential concerns for levee embankment and foundation stability. Although stability is a function of many factors, including slope height and properties of the underlying soil, steep slopes typically are more susceptible to instability than shallow slopes. If underlain by expansive soil, relatively steep slopes may also be subject to slope creep, a gradual downslope movement of near-surface soil in response to seasonal shrink-swell cycles.

During our field reconnaissance, levee and stream bank slopes steeper than approximately 2:1 (about 27 degrees) were identified for special consideration as to potential instability. The locations of these relatively steep slopes are summarized in Table 2. In general, steeper slope conditions were assigned a higher degree of severity, particularly where accompanied by other evidence of potential instability, such as severe erosion, ground deformation, and surface cracking.

A geotechnical investigation consisting of subsurface exploration and laboratory testing should be performed to identify and characterize soil and groundwater conditions in the vicinity of relatively steep levee and stream bank slopes. Information collected during the investigation should be used to develop appropriate soil parameters for evaluating the stability of existing levee and stream bank slopes under FEMA-designated loading conditions.

Ground Deformation and Cracking

During our field reconnaissance, cracks in the ground and pavement were observed along the crests of the east and west levees. The most significant crack encountered during the reconnaissance is located along the crest of the east levee between Stations 113+35 and 114+15. Based on field measurements using a tape and steel probe, the crack is up to about 1 inch wide and at least 30 inches deep in some areas. Locations and descriptions of other ground and pavement cracks observed during our field reconnaissance are summarized in Table 2.

Ground deformation and cracking may be the result of many factors, including expansive soil, slope creep, slope instability, and settlement. Pavement may also crack as a result of excessive loading, thermal expansion, variation in subgrade materials and properties, and natural wear and aging. Because ground and pavement cracks have a variety of potential causes, they are not necessarily indicative of potential embankment and/or foundation instability. However, in identifying areas of potential concern for slope instability during the site reconnaissance, higher levels of severity were assigned to relatively wide, deep, continuous, and/or densely spaced cracks; cracks showing evidence of vertical offset; arcuate crack patterns; ground cracks; and cracks located adjacent to steep slopes. Ground deformation and cracking patterns consistent with significant settlement of levee embankments were not observed during our field reconnaissance.

Areas of significant ground deformation and cracking identified during our field reconnaissance should be further studied to examine potential causes and evaluate whether the cracks are due to marginal stability, incipient instability, and/or slope creep. Additional study may include geotechnical investigation to characterize subsurface conditions and identify strength and shrink-swell properties of embankment and underlying foundation materials. If the observed cracks are potentially related to slope instability, stability analyses based on subsurface information collected during the geotechnical investigation may be necessary.

As part of regular maintenance activities, levee and stream bank slopes should be observed for ground deformation and cracking that may indicate potential settlement or instability problems. If the observed deformation and cracking are the result of settlement or instability, appropriate measures should be implemented to mitigate the effects of ground movement and stabilize levee slopes. Open cracks should be filled or sealed to limit infiltration of surface water and reduce the potential for continued deformation and crack growth.

Erosion and Scour

Erosion and scour within the stream channel have the potential to undermine levee and stream bank slopes and affect the stability of levee embankments and/or foundations. Areas of significant erosion and scour observed during our field reconnaissance are summarized and described in Table 2. In general, the observed erosion and scour are relatively minor and do not appear to significantly affect the potential stability of nearby slopes. However, along the east side of Stevens Creek between Stations 112+00 and 124+20, erosion has resulted in moderate to severe over-steepening of stream bank slopes. As described above, recent instability of the east stream bank slope between Stations 121+00 and 123+00 appears to be the result of erosion near the toe of the slope.

Further study of potential hydraulic conditions within the stream channel should be performed to identify areas where erosion and scour may cause oversteepening and/or undermining of stream bank or levee slopes. Where such conditions currently exist or may occur as a result of anticipated stream flows, the need for erosion control measures to protect levee and stream bank slopes should be evaluated. As described above, geotechnical investigation may be necessary in areas where erosion has led to the development of steep levee or stream bank slopes that require analyses to evaluate their stability under FEMA-designated loading conditions.

Existing erosion control measures within the stream channel, including riprap and concrete sack slope protection, should be regularly inspected and maintained to limit the potential for undermining and instability of levee and stream bank slopes. Healthy and continuous vegetative cover should be maintained on all exposed levee and stream bank slopes. Where erosion- and scour-related damage occurs, affected slopes and structures should be repaired and appropriate erosion control measures installed to protect against further damage.

Animal Burrows

Animal burrows may weaken levee and stream bank slopes and provide potential conduits for seepage and/or piping beneath and through the levees. Burrow holes and associated piles of loose soil material also disturb the ground surface and may contribute to localized erosion of levee and stream bank slopes. Ground squirrel burrows can grow to 30 feet or more in length and extend 2 to 4 feet below the ground surface. Gopher burrows are typically shallower, but can extend for several hundred feet.

During our field reconnaissance, burrow holes less than about 2 to 3 inches in diameter were attributed to gophers, and burrow holes greater than about 2 to 3 inches in diameter were attributed to ground squirrels, although in most cases the actual type of burrowing animal that created the hole is uncertain. Because of their larger diameter and presumed depth, ground squirrel burrows observed in levee and stream bank slopes were typically assigned higher levels of relative severity than gopher burrows.

Areas of significant burrowing activity that were observed during our field reconnaissance are summarized and described in Table 2. In general, the severity of burrowing observed on the west levee and the southern half of the east levee ranges from slight to moderate. Along the east levee between Stations 126+80 and 142+50, extensive gopher burrows were observed on the outboard side of the flood wall. On the inboard side of the flood wall, only a few burrows were observed against the base of the wall. However, if burrows on the inboard and outboard sides of the wall are connected, they present a potential conduit for seepage and piping that could undermine the wall foundation during a flood event. Numerous ground squirrel burrows also were observed on the outboard slope of the east levee between Stations 142+50 and 169+50.

During our field reconnaissance, heavy vegetation may have obscured evidence of burrowing activity on some levee embankment and stream bank slopes. A more thorough burrow survey, conducted at a time when the vegetation is lower, may be considered as part of further studies. Burrow surveys should be performed regularly as part of ongoing levee maintenance programs. Where significant burrowing activity is observed, appropriate measures to control gopher and/or ground squirrel populations, such as trapping and baiting, should be implemented. Levee embankments and foundations affected by burrowing activity should be repaired by backfilling burrows with cement grout and/or excavating and replacing burrowed materials with engineered fill.

Encroachments

As summarized and described in Table 2, encroachments identified during our field reconnaissance include structures, buried utilities, and trees located on, beneath, or adjacent to levee and stream bank slopes. While most of the observed encroachments do not appear to significantly affect the potential for seepage or embankment and foundation stability, some may become sources of concern if not properly managed and/or maintained.

Encroachments observed during our field reconnaissance that are of particular concern include the following:

- irrigation systems along the crest of the west levee between Stations 113+50 and 130+30 and between Stations 143+00 and 150+00
- large trees growing on inboard and outboard levee and stream bank slopes on both sides of the creek
- a flat bench for nursery tree storage that was constructed by minor grading of the west levee's outboard slope between Stations 143+00 and 148+00

Irrigation lines that are damaged or improperly operated may cause saturation, erosion, and/or softening of surrounding soil. Repairs to damaged irrigation lines and other utilities also may require excavation and replacement of levee embankment and foundation materials. If decayed, tree roots may weaken embankment and foundation materials and act as conduits for seepage. Fallen and uprooted trees may damage levee and stream bank slopes, leading to potential erosion and/or slope instability.

It appears that the bench on the outboard slope of the west levee between Stations 143+00 and 148+00 was constructed primarily by placing fill on the slope. However, minor excavation and/or disturbance of levee embankment material also may have occurred during construction of the bench. Containerized trees stored on the bench are served by an irrigation line located at the top of the outboard levee slope between Stations 143+00 and 150+00. It is not clear whether nursery-related improvements along this stretch of the levee were constructed with the knowledge or approval of the District.

Further studies should examine the condition of and need for removing, relocating, and/or maintaining existing encroachments along the east and west levees. Ongoing levee maintenance programs should include efforts to monitor and manage encroachments as appropriate. These efforts may include pruning or removing unhealthy, unstable, and/or interfering trees from levee and stream bank slopes. All encroachments should be managed and maintained in a manner that limits the potential for seepage, erosion, and instability of levee embankments and foundations.

OTHER ISSUES OF POTENTIAL CONCERN

Some non-geotechnical issues of potential concern also were observed during site reconnaissance activities. As summarized and described in Table 2, these issues include the presence and condition of outfalls and other embankment penetrations, adverse channel conditions, and miscellaneous maintenance considerations. The following sections describe these issues and discuss observations that may be relevant to further study, investigation and/or analysis by others.

Outfalls and Other Embankment Penetrations

During our field reconnaissance, existing storm drain outfalls and other levee penetrations were identified and observed for evidence of blockage, damage, and/or distress. Where accessible, the presence and condition of backflow prevention devices also were observed and documented. In most cases, outfalls observed during our field reconnaissance appear to be in relatively good condition. However, as described in Table 2, several outfalls are blocked or clogged by soil, vegetation, and/or debris.

Although some of the observed storm drain outfalls include flap gates at the channel outlet, most appear to rely on alternative backflow prevention devices that were not located or observed during our field reconnaissance. More detailed reconnaissance of storm drain manholes and vaults on the outboard sides of the levees may be considered as part of further studies. To maintain the effectiveness of the levees and associated flood control systems, ongoing maintenance programs should include regular inspection of outfalls, penetrations, and closures. Outfalls and closures should be cleared of debris and maintained in good working order to avoid backflow during periods of high water inside the levees.

Adverse Channel Conditions

Adverse channel conditions observed during our field reconnaissance include heavy vegetation on stream bank slopes, piles of debris within the stream channel, and fallen trees across the channel. In the area immediately upstream of the Crittenden Lane Bridge, the stream channel also becomes narrower, which may cause floodwaters to back up behind the bridge. Hydraulic analyses performed for levee recertification should consider these channel conditions during development of estimated flood elevations. If necessary, vegetation and debris should be cleared from the channel to increase channel capacity and maintain an acceptable amount of freeboard above design flood elevations.

The stream channel should be regularly inspected for blockages and other adverse conditions that may lead to increased flood elevations and/or erosion of stream bank and levee slopes. As part of regular maintenance work, excess sediment and debris should be removed from the channel as necessary to maintain adequate flow. Heavy vegetation and other potential debris-trapping obstructions also should be identified and cleared from the channel if necessary.

Miscellaneous Maintenance Considerations

Miscellaneous maintenance considerations identified during our field reconnaissance are generally related to vegetation control, debris within the stream channel, and blocked storm drain outfalls. These considerations are discussed in relevant sections above and summarized and described in Table 2.

It should be noted that mowing activities were observed on the east levee several days after completion of reconnaissance work on that side of the creek. This suggests that thick vegetation

observed on some levee slopes at the time of the reconnaissance may be a result of the District's mowing schedule rather than an indication of inadequate maintenance.

CONCLUSION

In our opinion, levee and channel conditions observed along the Stevens Creek east and west bank levees do not generally indicate serious geotechnical problems that could jeopardize potential levee recertification. However, a number of minor geotechnical issues and areas of potential concern were noted during the reconnaissance. Further investigation, study, and analysis of these issues are necessary to complete the recertification process and demonstrate adequate performance of the existing levees under FEMA-designated loading conditions. It is anticipated that most issues of potential concern identified during recent field reconnaissance activities can be addressed through appropriate levee and channel maintenance programs.

REFERENCES

Berlogar, 1981, Geotechnical Investigation, Proposed Stevens Creek Flood Control Improvements, Central Expressway to San Francisco Bay, Santa Clara County, California, prepared by Berlogar, Long and Associates for the Santa Clara Valley Water District, December 8.

TABLES

TABLE 1

SUMMARY OF REACHES - LEVEE FIELD RECONNAISSANCE

Stevens Creek Levee Recertification Project, Phase B2

Mountain View, California

Reach	Location/Description	Approximate Station		Approximate Levee or Flood Wall Dimensions					Features of Interest				
		From	To	Length (ft)	Height above Outboard Toe (ft)	Crest Width (ft)	Inboard Slope (degrees)[1]	Outboard Slope (degrees)[1]	Erosion Protection	Penetrations	Flood Wall	Other Structures	Utilities
E-1	East side of Stevens Creek, from Highway 101 to approximately 560 feet north of Highway 101, with a gravel-surfaced access road on the levee crest and a concrete block sound wall along the top of the outboard slope. Near the south end of the reach, the creek flows through an open, concrete-lined channel with a trapezoidal section that directs water down a drop structure and through a series of rock and concrete dissipation baffles in the bottom of the channel.	110+40	116+00	560	2 - 3	12 - 14	24 - 26	15	X			X	X
E-2	East side of Stevens Creek, approximately 560 to 960 feet north of Highway 101, with an unimproved and gravel-surfaced access road along the levee crest. Near the north end of the reach, the creek flows through an open, concrete-lined channel with a trapezoidal section that directs water down a drop structure and through a series of rock and concrete dissipation baffles in the bottom of the channel.	116+00	120+00	400	3 - 6	12	30 - 33	20 - 30	X	X		X	
E-3	East side of Stevens Creek, approximately 960 to 1,640 feet north of Highway 101, with a graded stream channel slope at the north end of the reach and an unimproved and gravel-surfaced access road along the "levee" crest (see Note 2).	120+00	126+80	680	0 - 1.5	12 - 16	n/a[2]	< 10		X			
E-4	East side of Stevens Creek, approximately 1,640 to 3,210 feet north of Highway 101 and 4,270 to 2,700 feet south of the Crittenden Lane Bridge, with a graded stream channel slope and gravel-surfaced access road on the inboard side of a 1- to 8-foot-high concrete flood wall.	126+80	142+50	1,570[3]	1 - 8[3]	n/a[3]	n/a[3]	n/a[3]		X	X		
E-5	East side of Stevens Creek, from approximately 3,210 feet north of Highway 101 to the Crittenden Lane Bridge, with a gravel-surfaced access road along the levee crest.	142+50	169+50	2,700	8 - 18	12	28 - 32	26 - 30	X	X		X	X
W-1	West side of Stevens Creek, from Highway 101 to approximately 250 feet north of Highway 101, with a relatively wide, flat, and unimproved crest area. Near the south end of the reach, the inboard levee slope is supported by a concrete retaining wall and the creek flows through an open, concrete-lined channel with a trapezoidal section that directs water down a drop structure and through a series of rock and concrete dissipation baffles in the bottom of the channel.	111+00	113+50	250	3	20 - 50	10 - 20	25 - 30	X			X	X
W-2	West side of Stevens Creek, approximately 250 to 900 feet north of Highway 101, with a graded stream channel slope and a paved bicycle/pedestrian trail that runs along the levee crest. Near the north end of the reach, the creek flows through an open, concrete-lined channel with a trapezoidal section that directs water down a drop structure and through a series of rock and concrete dissipation baffles in the bottom of the channel.	113+50	120+00	650	2 - 5	12 - 14	30	25 - 30	X			X	X
W-3	West side of Stevens Creek, approximately 900 to 1,930 feet north of Highway 101, with a graded stream channel slope and a paved bicycle/pedestrian trail that runs along the levee crest (see Note 4).	120+00	130+30	1,030	0 - 2	12 - 15	30 - 35	< 20	X	X	X	X	X
W-4	West side of Stevens Creek, approximately 1,930 to 2,300 feet north of Highway 101 and 3,920 to 2,650 feet south of the Crittenden Lane Bridge, with a graded stream channel slope at the south end of the reach and a paved bicycle/pedestrian trail that runs along the levee crest.	130+30	143+00	1,270	2 - 14	12 - 14	28 - 30	26 - 31		X		X	X
W-5	West side of Stevens Creek, from approximately 2,650 feet north of Highway 101 to the Crittenden Lane Bridge, with a paved bicycle/pedestrian trail that runs along the levee crest.	143+00	169+50	2,650	6 - 14	12 - 14	26 - 30	26 - 30	X	X		X	X

Notes:

1. Slopes estimated in the field using a Brunton compass
2. Reach E-3 may not qualify as a "levee". The ground surface on the outboard side of the stream bank is is generally at a similar or just slightly lower elevation than the access road that runs along along the top of the bank. There is no well-defined levee "toe" on the outboard side of the road.
3. Length and height above outboard toe refers to flood wall geometry; other dimensions not applicable.
4. Portions of Reach W-3 may not qualify as a "levee". The ground surface on the outboard side of the bicycle/pedestrian trail is generally obscured by heavy vegetation, but appears to be at an elevation near that of the levee crest. Along much of the reach, the outboard levee "toe" is not well defined.

TABLE 2

SUMMARY OF KEY OBSERVATIONS - LEVEE FIELD RECONNAISSANCE

Stevens Creek Levee Recertification Project, Phase B2

Mountain View, California

Reach	Station		Key Observations	Observed Condition and Degree of Severity[1]											Potential Geotech Issue?	Follow-up	By[2]	Comments/Notes
	From	To		Settlement	Erosion	Stability	Ground Cracks or Deformation	Encroachments	Maintenance	Structural Problems	Seepage	Closures or Drainage	Adverse Channel	Animal Burrows				
E-1	110+40	116+00	Erosion along the toe of the stream bank slope and beneath the downstream corner of the concrete-sack apron has undermined some of the concrete blocks and caused the edge of the apron to collapse (112+50)		2											inspection/maintenance	SCVWD	See Note 4
			Moderately steep (>26°) stream bank slope below inboard toe (112+00 - 116+00)		1	2									X	exploration/analysis	PGE/AMEC	
			Large (~ 1" wide by 18-36" deep) longitudinal crack near centerline of crest (113+35 - 114+15)			3	5								X	exploration/analysis	PGE/AMEC	Potential maintenance required
			High voltage electrical tower at toe of inboard slope (111+50)					1								none	--	
			Tall and thick grasses and weeds obscure view of the inboard slope						2							maintenance	SCVWD	
			Trees, overhanging limbs, and debris in heavily vegetated channel (112+00 - 116+00)						4				4			analysis/maintenance	S&W/SCVWD	See Note 4
			Minor burrows on stream bank and outboard slopes, mostly gopher with some ground squirrel holes[3]											1	X	maintenance	SCVWD	
E-2	116+00	120+00	The upper portion of the inboard levee/stream bank slope is relatively steep (~30-33°) and the lower portion is even steeper in some areas as a result of erosion in the creek channel (116+00 - 119+00)		3	3									X	exploration/analysis	PGE/AMEC/S&W	
			Erosion/scour has caused the upstream edge of the concrete-sack apron (118+80) to become undermined		2											inspection/maintenance	SCVWD	See Note 4
			Open hole (circular, approx. 12" diameter, and at least 2' deep) near the crest of the outboard slope, perhaps a former utility pole location (116+50)				1									maintenance	SCVWD	
			Many trees and shrubs on the inboard levee/stream bank slope, two trees at the toe of the outboard slope					2								maintenance	SCVWD	See Note 4
			Storm drain outfall, sediment in bottom, unable to view backflow prevention device (116+30)						2			2				inspection/maintenance	SCVWD	
			Storm drain outfall, blocked by vegetation and debris, unable to view backflow prevention device (116+40)						3			2				inspection/maintenance	SCVWD	
			Trees, overhanging limbs, and debris in heavily vegetated channel (116+00 - 119+00)						4				4			analysis/maintenance	S&W/SCVWD	See Note 4
E-3[5]	120+00	126+80	Very steep (>45°) stream bank slope undercut by erosion at toe (120+00 - 124+20)		5	4									X	exploration/analysis	PGE/AMEC/S&W	
			Evidence of recent shallow sliding/sloughing of streambank slope (121+00 - 123+00)		3	5						1			X	exploration/analysis	PGE/AMEC	
			Trees and shrubs on stream bank slopes, some of the trees are undermined (120+00 - 124+20)					3								maintenance	SCVWD	See Note 4
			Tall and thick grasses and weeds obscure view of the inboard slope (124+20 - 126+80)						2							maintenance	SCVWD	
			Storm drain outfall, unable to view backflow prevention device (125+30)									1				inspection/maintenance	SCVWD	
			Trees, overhanging limbs, and debris in heavily vegetated channel (120+00 - 124+20)						3				3			analysis/maintenance	S&W/SCVWD	See Note 4
			Burrows on stream bank slope and on outboard side of access road, mostly gopher holes[3]											2	X	maintenance	SCVWD	
E-4	126+80	142+50	Minor erosion and oversteepening of the stream bank slope as a result of equipment traffic (tire ruts) along the maintenance road at the base of the slope		1										X	maintenance	SCVWD	
			Steep (~30-35°) stream bank slopes (126+80 - 142+50)			2									X	exploration/analysis	PGE/AMEC	
			Longitudinal cracks (up to approx. 1/4" wide) in soil along the inboard side of the access road at the crest of the stream bank slope (132+00 - 134+00)			2	3								X	exploration/analysis	PGE/AMEC	
			Tall and thick grasses and weeds obscure view of the inboard slope						2							maintenance	SCVWD	
			Storm drain outfall, unable to view backflow prevention device (128+80)									1				inspection/maintenance	SCVWD	
			Storm drain outfall, unable to view backflow prevention device (136+50)									1				inspection/maintenance	SCVWD	
			Occasional gopher[3] burrows on the inboard side and near the base of the flood wall, abundant gopher[3] burrows on the outboard side and near the base of the flood wall; burrows may present a seepage/piping problem if they are continuous beneath the wall											4	X	maintenance	SCVWD	

TABLE 2

SUMMARY OF KEY OBSERVATIONS - LEVEE FIELD RECONNAISSANCE

Stevens Creek Levee Recertification Project, Phase B2

Mountain View, California

Reach	Station		Key Observations	Observed Condition and Degree of Severity[1]											Potential Geotech Issue?	Follow-up	By[2]	Comments/Notes
	From	To		Settlement	Erosion	Stability	Ground Cracks or Deformation	Encroachments	Maintenance	Structural Problems	Seepage	Closures or Drainage	Adverse Channel	Animal Burrows				
E-5	142+50	169+50	Channel becomes narrower (constriction) at Crittenden Lane Bridge (167+50 - 169+50)		1								1			analysis	S&W	See Note 4
			Steep (~30-35 ^{o}) and relatively high (15-20') inboard and outboard slopes			2									X	exploration/analysis	PGE/AMEC	
			Steep riprap slope upstream of Crittenden Lane Bridge (168+50 - 169+50)			1									X	exploration/analysis	PGE/AMEC	
			Thick grasses and weeds obscure view of inboard and outboard slopes						1							maintenance	SCVWD	
			Minor debris in low-flow channel						1				1			maintenance	SCVWD	See Note 4
			Burrows on outboard slopes, many large ground squirrel holes [3] (146+00 - 152+00)		1									4	X	maintenance	SCVWD	
			Occasional burrows on inboard slopes, mostly gopher holes [3]											1	X	maintenance	SCVWD	
W-1	111+00	113+50	Trees and shrubs on inboard and outboard slopes and crest					2								maintenance	SCVWD	See Note 4
			High voltage electrical tower on inboard side of crest (111+20)					1								none	--	
			Trees, overhanging limbs, and debris in heavily vegetated channel (112+50 - 113+50)						4				4			analysis/maintenance	S&W/SCVWD	See Note 4
W-2	113+50	120+00	Moderately steep to steep (~30 ^{o}) inboard levee/stream bank slopes (114+00 - 117+00)			1									X	exploration/analysis	PGE/AMEC	
			Longitudinal cracks in pavement at crest (114+00 - 117+00)				2								X	exploration/analysis	PGE/AMEC	
			Thick vegetation (shrubs and trees) on outboard slope, most of slope is obscured					3								maintenance	SCVWD	See Note 4
			High voltage electrical towers at toes of inboard and outboard slopes (118+50)					1								none	--	
			Irrigation controls and piping on outboard slope (113+50 - 120+00)					1								none	--	
			Tall and thick grasses and weeds obscure view of inboard slope						2							maintenance	SCVWD	
			Trees, overhanging limbs, and debris in heavily vegetated channel (113+50 - 119+00)						4				4			analysis/maintenance	S&W/SCVWD	See Note 4
W-3[6]	120+00	130+30	Steep (~30-35 ^{o}) inboard levee/stream bank slopes (121+00 - 125+00 and 128+00 - 130+30)			2									X	exploration/analysis	PGE/AMEC	
			Longitudinal cracks in pavement at crest (121+00 - 125+00 and 128+00 - 130+30)				2								X	exploration/analysis	PGE/AMEC	
			Thick vegetation (shrubs and trees) on outboard slope, most of slope is obscured					3								maintenance	SCVWD	See Note 4
			High voltage electrical tower on outboard slope (127+00)					1								none	--	
			Irrigation controls and piping on outboard slope (120+00 - 125+50 and 127+00 - 130+30)					1								none	--	
			Tall and thick grasses and weeds obscure view of inboard slope						2							maintenance	SCVWD	
			Storm drain outfall, minor debris around flap gate (126+50)						1			1				maintenance	SCVWD	
			Trees, overhanging limbs, and debris in heavily vegetated channel (120+00 - 124+20)						3				3			analysis/maintenance	S&W/SCVWD	See Note 4
W-4	130+30	143+00	Minor erosion and oversteepening of the stream bank slope as a result of equipment traffic (tire ruts) along the maintenance road at the base of the slope		1										X	maintenance	SCVWD	
			Occasional, minor erosion along the inboard edge of the lower access road, adjacent to the low-flow channel		1											maintenance	SCVWD	
			Moderately steep to steep (~26-31 ^{o}) inboard and outboard slopes			1									X	exploration/analysis	PGE/AMEC	
			Longitudinal cracks in pavement at crest (130+30 - 134+00)				2								X	exploration/analysis	PGE/AMEC	
			Longitudinal cracks in pavement at crest (134+00 - 143+00)				1								X	exploration/analysis	PGE/AMEC	
			Trees and shrubs on inboard and outboard slopes					1								maintenance	SCVWD	See Note 4
			High voltage electrical towers on outboard slope (135+80 and 142+80)					2								none	--	
			Tall and thick grasses and weeds obscure view of inboard slope						2							maintenance	SCVWD	
			Storm drain outfall, debris and vegetation around flap gate (136+40)						3			3				maintenance	SCVWD	
			Storm drain outfalls, unable to view backflow prevention devices (136+40, 141+90)									1				inspection/maintenance	SCVWD	
			Fallen trees and debris in low-flow channel (133+00 and 136+50)						2				1			analysis/maintenance	S&W/SCVWD	See Note 4
			Burrows on inboard and outboard slopes, mostly gopher holes [3], some filled with grout											1	X	maintenance	SCVWD	

TABLE 2

SUMMARY OF KEY OBSERVATIONS - LEVEE FIELD RECONNAISSANCE

Stevens Creek Levee Recertification Project, Phase B2

Mountain View, California

Reach	Station		Key Observations	Observed Condition and Degree of Severity[1]											Potential Geotech Issue?	Follow-up	By[2]	Comments/Notes
	From	To		Settlement	Erosion	Stability	Ground Cracks or Deformation	Encroachments	Maintenance	Structural Problems	Seepage	Closures or Drainage	Adverse Channel	Animal Burrows				
W-5	143+00	169+50	Minor erosion and oversteepening of the inboard and outboard slopes as a result of equipment traffic (tire ruts) along access roads at the bases of the slopes		1										X	maintenance	SCVWD	
			Occasional, minor erosion along the inboard edge of the lower access road, adjacent to the low-flow channel		1											maintenance	SCVWD	
			Erosion/scour around the edges of the concrete apron and splash pool inside the low-flow channel where the 24-inch diameter outfall discharges near Station 159+50		1											inspection/maintenance	SCVWD	See Note 4
			Channel becomes narrower (constriction) at Crittenden Lane Bridge (167+50 - 169+50)		1								1			analysis	S&W	See Note 4
			Moderately steep (~26-30 ^{o}) inboard and outboard slopes			1									X	exploration/analysis	PGE/AMEC	
			Steep riprap slope upstream of Crittenden Lane Bridge (168+50 - 169+50)			1									X	exploration/analysis	PGE/AMEC	
			Longitudinal cracks in pavement at crest (157+50 - 168+50)				1								X	exploration/analysis	PGE/AMEC	
			Minor grading of the outboard slope (mostly fill, but potentially some cut) has been performed to create a flat bench for nursery tree storage, presumably without SCVWD approval (143+00 - 148+00)		1	1	1	3							X	maintenance	SCVWD	
			Buried PVC piping for nursery irrigation operations has been installed near the top of the outboard slope, presumably without SCVWD approval (143+00 - 150+00)					2								maintenance	SCVWD	
			High voltage electrical towers on outboard slope (145+00, 151+00, 159+00, and 168+00)					2								none	--	
			Thick grasses and weeds obscure view of inboard and outboard slopes						1							maintenance	SCVWD	
			Storm drain outfall is blocked (in "closed" position) by soil around the flap gate and appears to be inoperable, no splash apron or other erosion protection observed at the outfall discharge point (155+20)		1				4			4				maintenance	SCVWD	Consider abandonment if outfall is no longer needed
			Storm drain outfall, unable to view backflow prevention device (159+50)									1				inspection/maintenance	SCVWD	
			Burrows on inboard and outboard slopes, mostly gopher holes [3], some filled with grout											1	X	maintenance	SCVWD	

Notes:

1. Severity Code: 1 = Slight, 2 = Slight to Moderate, 3 = Moderate, 4 = Moderate to Severe, 5 = Severe
2. AMEC = AMEC-Geomatrix, PGE = Pacific Geotechnical Engineering, S&W = Schaaf & Wheeler, SCVWD = Santa Clara Valley Water District
3. For classification purposes, holes less than approximately 2 to 3 inches in diameter are considered indicative of gopher burrows and holes greater than approximately 2 to 3 inches in diameter are considered indicative of ground squirrel burrows
4. Others should evaluate the actual need for corrective action and develop appropriate corrective measures, if necessary
5. Reach E-3 may not qualify as a "levee". The ground surface on the outboard side of the stream bank is is generally at a similar or just slightly lower elevation than the access road that runs along along the top of the bank. There is no well-defined levee "toe" on the outboard side of the road.
6. Portions of Reach W-3 may not qualify as a "levee". The ground surface on the outboard side of the bicycle/pedestrian trail is generally obscured by heavy vegetation, but appears to be at an elevation near that of the levee crest. Along much of the reach, the outboard levee "toe" is not well defined.

FIGURES



N

0 100 200 Feet

EAST AND WEST BANK LEVEES
Stevens Creek Levees
FEMA Levee Certification
Mountain View, California

By: DMO	Date: 2/24/2009	Project No. 13815.002
AMEC Geomatrix		Figure 1

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EAST AND WEST BANK LEVEES
Stevens Creek Levees
FEMA Levee Certification
Mountain View, California

By: DMO	Date: 2/24/2009	Project No. 13815.002
AMEC Geomatrix		Figure 2

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N

0 100 200 Feet

EAST AND WEST BANK LEVEES
Stevens Creek Levees
FEMA Levee Certification
Mountain View, California

By: DMO	Date: 2/24/2009	Project No. 13815.002
AMEC Geomatrix		Figure 3

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ATTACHMENT 1

FIELD RECONNAISSANCE LOGS

STEVENS CREEK EAST LEVEE

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/28/08
Project Number: 13815.002.0
Weather Conditions: cloudy, mild ≈ 70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Right (East) Bank — **Station Interval** From: 110+40 To: 116+00
Other Reach/Location ID: Along Soundwall

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation				
Height above Outboard Toe:	2-3	ft	☐ Visual	☒ Rod and Hand Level	☐ Other		
Crest Width:	12-14	ft	☐ Visual	☐ Pace	☒ Tape	☐ Other	
Inboard Slope:	24-26	(deg) H:V %	☐ Visual	☒ Brunton Compass		☐ Other	
Outboard Slope:	15°	(deg) H:V %	☐ Visual	☒ Brunton Compass		☐ Other	

☒ Erosion Protection	Type:	Concrete socks on streambank slope	Location:	111+90 - 112+40	Condition:	fair - overgrown, some scour
☐ Penetrations	Type:		Location:		Condition:	
☐ Floodwall	Type:		Location:		Condition:	
☒ Other Structures	Type:	Sound wall	Location:	110+35 to 116+00	Condition:	good
		Concrete channel / drop structure		110+35 to 111+90		good
		O/H Electric Tower		111+50		

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☒	☒	
Grass	☒	☒	☐	
Shrubs	☒	☐	☐	
Trees	☐	☐	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☒	
Pavement	☐	☐	☐	
Other	☐	☐	☐	

Additional Explanation/Notes:

Built-up levee along this reach is only a few feet high. A sound wall (approx. 12-14 ft. high, 9" wide, textured ~~reinforced~~ concrete block construction) runs along the outboard crest of the levee. Behind the sound wall, the outboard levee slope is relatively gentle and blends into the surrounding ground surface without a distinct toe. From the inboard crest of the levee, the levee slope descends to an approximately 8- to 12-foot-wide bench. Along the inside edge of the bench, the streambank slopes are relatively steep as they lead to the bottom of

☒ Continued at end of report

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

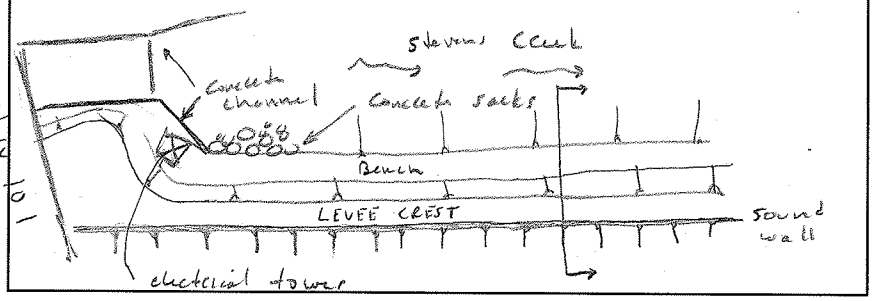
Low flow in bottom of channel

☐ Continued at end of report

Station Interval				Other Reach/Location ID
From:	110+40	To:	116+00	

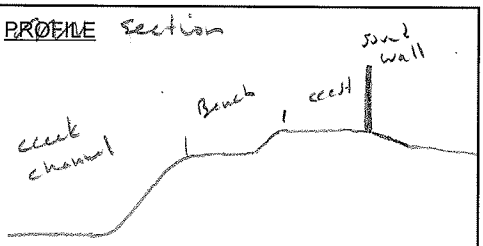
SKETCHES

PLAN



NOTES

PROFILE Section



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe	
	☐ **Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐	
a)	☒ **Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☐ X	☐	☐	
b)	☒ **Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐ X	☐	☐	
c)	☒ **Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	☐	☒	113+35 to 114+15
	☒ **Encroachments by vegetation or other improvements** (Electrical tower)	☒	☐	☐	
d)	☒ **Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐ X	☐	☐	
	☐ **Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐	☐	☐	
	☐ **Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐	
	☐ **Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐	☐	☐	
e)	☒ **Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐	☐ X	☐	
f)	☒ **Animal burrows**	☒	☐	☐	

Further describe the location, extent and nature of checked items:

a) Noted erosion/scour at toe of inboard streambank slope in area of energy dissipation baffles downstream of the concrete channel and drop structure. Also along downstream edge of Concrete-sack facing.

b) Streambank slopes are steep (> 2:1) in some areas.

c) A large, longitudinal crack was noted in the crest of the levee between about Stationing 113+35 and 114+15. The crack is up to approximately 1-inch wide. I could push through a steel prong probe about 18"-36" into the ground in many areas along the crack. Cause of the

☒ Continued at end of report

Right (East) Bank
110+40 - 116+00

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Descriptions, Continued:

the creek channel. The streambank slope measured near Station 115+00 is about 35 degrees.

Between Stations 110+40 (D.S. end of Hwy 101 culvert) and 111+90, the creek runs in an open concrete channel with a low drop structure at about station 111+50. On this side of the creek, the channel is about 13 ft deep and has a vertical wall. The crest of the levee is set back from the concrete channel and is about 3 to 4 feet higher in elevation.

Downstream of the concrete channel, a series of concrete/rock energy dissipation baffles are located in the channel. Some scour is noted on this side of the channel between the baffles and the channel slope, and at the end of the concrete sack slope protection

An overhead electrical tower is located between the toe of the inboard levee slope and the edge of the concrete channel near Station 111+50.

Downstream of the concrete channel, the streambank slope is covered with concrete-sack facing from about stations 111+90 to 112+40.

The creek channel and streambank slopes along this reach are heavily vegetated with trees and shrubs. Lots of debris in channel downstream of baffles.

Sta. 115+50 - Hole (settled boring?) ≈ 6" diam and 18" deep in crest of levee.

Observations, Cont.:

crack is not readily obvious. Streambank slopes are less steep in the area of the crack than in other nearby areas where no crack is observed.

d) Grass/weeds are thick and high on the inboard levee slope, channel obstructions (see e.).

e) Channel is heavily vegetated/overgrown with trees and shrubs. Many overhanging limbs and branches with dead trees lying across the channel. Debris and

f) minor gopher/ground squirrel activity noted in streambank slopes.

Station Interval			Other Reach/Location ID
From: 110+40	To: 116+00	East Bank	

PHOTOS

Photo ID	Location	Description
1-3	110+40	Levee and channel, looking North
4, 5	112+00	N/S views of levee slope (inboard)
6-8	112+00	Concrete channel and drop structure
9-11	111+50	Concrete sack slope and dissipator baffles
12, 13	112+30	Scour between edge of baffles and concrete sack slope
14-16	112+50	Scour at downstream end of Concrete Sack slope
17-21	113+00	Heavy growth and debris in channel (panorama)
22	113+00	channel looking upstream
23, 24	113+40	crack in levee crest
25	113+50	" " " " - probe buried @ 34"
26, 27	113+80	" " " " - " " 36"
28	114+20	Downstream end of crack
29, 30	114+50	N/S view of inboard slope
31	114+50	Heavy vegetation in channel
32	115+50	Hole (sunken boring?) in levee crest, @ 10" deep)
33, 34	110+40	Buried pipe/casing? Next to Hwy 101 bridge
35, 36	116+00	N/S views of inboard slope
37-39	116+00	Heavy growth/debris in channel
40	113+20	outboard slope (S. view)
41, 42	114+50	N/S views of outboard slope
43	116+00	S view of outboard slope.

SURVEY POINTS

Point ID	Location	Description
1	113+35	Beginning of crack in levee crest
2	114+15	End of crack in levee crest

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/28/08
Project Number: 13815.002.0
Weather Conditions: cloudy, mild ~ 70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Right (East) Bank — **Station Interval** From: 116+00 To: 120+00

Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation				
Height above Outboard Toe:	3-6	ft	☐ Visual	☒ Rod and Hand Level	☐ Pace	☒ Tape	☐ Other
Crest Width:	12	ft	☐ Visual	☐ Rod and Hand Level	☐ Pace	☒ Tape	☐ Other
Inboard Slope:	30-33	(deg) H:V %	☐ Visual	☒ Brunton Compass			☐ Other
Outboard Slope:	20-30	(deg) H:V %	☐ Visual	☒ Brunton Compass			☐ Other

☒ Erosion Protection	Type: Concrete apron/sack surfacing	Location: 118+80 - 119+80	Condition:	okay, some scour
☒ Penetrations	Type: Storm drain outfalls (12")	Location: 116+30, 116+40	Condition:	clogged w/ debris, poor
☐ Floodwall	Type:	Location: 119+00	Condition:	
☒ Other Structures	Type: Concrete apron/drop structure	Location:	Condition:	

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☒	
Grass	☒	☒	☐	
Shrubs	☒	☐	☐	
Trees	☒	☒ at toe	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☒	
Pavement	☐	☐	☐	
Other	☐	☐	☐	

Additional Explanation/Notes:

Levee in this reach appears to be built over the streambank slope. There is no discernable break in slope where levee ends and streambank begins. Inboard levee/streambank slope is very steep (30°+) in the upper portion of the slope. The slope is even steeper near the toe, where it appears to be eroded. Outboard slope is also relatively steep, but is not particularly high. Between stations 119+00 and 120+00, the channel includes a concrete apron/drop structure with concrete-sack slope protection upstream and downstream of the structure. ☒ Continued at end of report
Riprap/concrete baffles are located in the channel downstream of the structure.

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

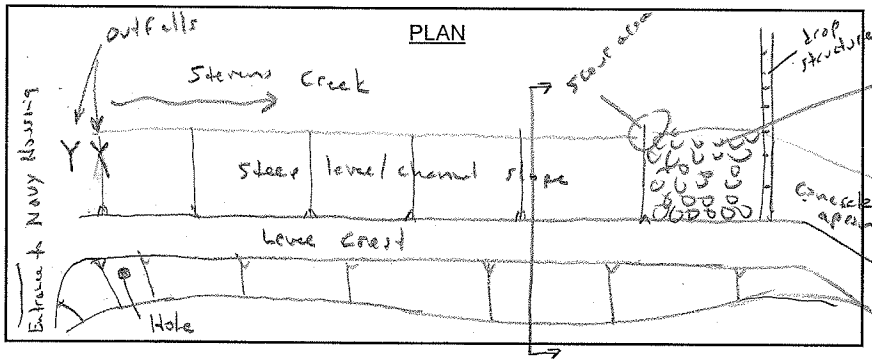
Slow moving water in bottom of channel, low flow.

☐ Continued at end of report

Station Interval		Other Reach/Location ID
From: 116 + 00	To: 120 + 00	

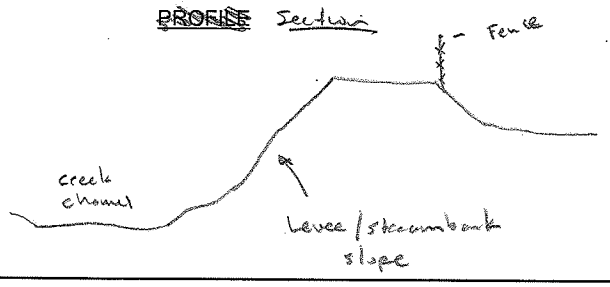
SKETCHES

PLAN



NOTES

PROFILE Section



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe
	☐ **Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐
a)	☒ **Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☐	☒	☐
b)	☒ **Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐	☒	☐
c)	☒ **Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☒	☐	☐
d)	☒ **Encroachments by vegetation or other improvements**	☐ X	☐	☐
e)	☒ **Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐	☒	☐
	☐ **Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐	☐	☐
	☐ **Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐
f)	☒ **Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐	☒	☐
j)	☒ **Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐	☐ X	☐
	☐ **Animal burrows**	☐	☐	☐

Further describe the location, extent and nature of checked items:

a) Sta. 116+00 to Sta. 119+00: Lower portion of streambank slope is oversteepened due to erosion. Undercutting of slope is particularly severe near Sta. 118+50, immediately upstream of the concrete-sack slope protection associated w/ the drop structure.

Sta. 118+80: Upstream edge of concrete-sack slope protection is undermined due to scour/erosion at toe of streambank slope.

b) Sta. 116+00 to 119+00: Steep inboard levee/streambank slopes (30°+)

☒ Continued at end of report

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, cont.:

2 storm drain outfalls –

Sta. 116+30 – 12" pipe (Concrete?) w/ concrete headwall – 1/3 full of silt

Sta. 116+40 – 12"? CMP – badly clogged w/ debris

Neither outfall has a flap for backflow prevention. Two manholes (one unmarked, one marked as sanitary sewer) on outboard side of levee may be associated with these outfalls. Manholes not surveyed due to tree cover.

Station 116+50: Deep hole (>36"), approx 12" diameter observed at outboard edge of crest. Hole is filled with leaves and debris, but was able to push probe about 36" into hole with little resistance. Wood fragments around the edges suggest this may be the former location of a telephone pole that wasn't properly backfilled.

Note ≈ 6 to 7 foot drop in levee crest elevation between Sta. 118+50 and Sta. 120+00, coincident with location of drop structure. (Total drop apparent in channel across structure is about 24".

Observations, continued:

c) Sta. 116+50: Hole at near crest of outboard slope. Approx. 12" diam. hole is filled w/ leaves and debris. Former telephone pole? See description above.

d) Sta. 116+00 to 119+00 and 120+00: Inboard levee/streambank slope is heavily vegetated w/ trees and shrubs. Two trees at toe of outboard slope at Sta. 116+50.

e) Overgrown trees/debris in channel (see g). Blocked/silted outfalls (see f).

f) 2 outfalls (Stas. 116+30 and 116+40) w/out observed flaps/backflow prevention. Outfall at 116+40 is badly clogged/blocked w/ debris.

g) Heavy tree growth in channel (Sta. 116+00 to 119+00). Downed trees across channel, debris caught in trees on streambank slopes.

Station Interval		Other Reach/Location ID
Right (East Bank)		
From: 116+00	To: 120+00	

PHOTOS

Photo ID	Location	Description
44, 45	116+30	SD outfall w/ headwall
46, 47	116+40	SD outfall - badly clogged
48, 49	117+50	N/S views of steep bank slope
50	118+00	steep bank slope (N. view)
51	118+00	Trees / vegetation in channel
52, 53	116+50	Deep (>36") hole on outboard slope.
54	116+50	Outboard slope (N. view)
55, 56	118+50	N/S views of outboard slope
57, 58	117+50	N/S views of inboard slope
59, 60	119+00	" " " " "
61-63	119+00	Scour at upstream end of concrete sack surfacing
64-68	119+50	apron / drop structure
69-70	119+00	scour at upstream end of concrete-sack surfacing (from opp. bank)
71, 72	119+50	up & dn. upstream / downstream channel
73-76	120+00	N/S views of inboard / outboard slopes

SURVEY POINTS

Point ID	Location	Description
3	116+30	SD outfall (24" above invert)
4	116+40	SD outfall (24" above invert)

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/29/08
Project Number: 13815.002.0
Weather Conditions: cloudy, mild ≈ 70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Right (East) Bank — **Station Interval** From: 120+00 To: 126+80

Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation					
* Height above Outboard Toe:	< 1.5	ft	☒ Visual	☐ Rod and Hand Level	☐ Other	
* Crest Width:	12 - 16	ft	☐ Visual	☐ Pace	☒ Tape	☐ Other	
* Inboard Slope:	n/a	deg H:V %	☐ Visual	☐ Brunton Compass	☐ Other	
* Outboard Slope:	< 10	(deg) H:V %	☒ Visual	☐ Brunton Compass	☐ Other	

☐ Erosion Protection	Type:		Location:		Condition:	
☒ Penetrations	Type:	15" cmp w/ conc. apron	Location:	125+30	Condition:	good
☐ Floodwall	Type:		Location:		Condition:	
☐ Other Structures	Type:		Location:		Condition:	

Ground Cover:

	~~Inboard~~ Streambank Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☒	
Grass	☒	☒	☐	
Shrubs	☒ Sta. 120+00 to	☐	☐	
Trees	☒ 124+20	☐	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☒	
Pavement	☐	☐	☐	
Other	☐	☐	☐	

Additional Explanation/Notes:

* Questionable as to whether a "levee" actually exists along this reach. The Outboard ground surface is only slightly (12"-18" at most) lower than the gravel roadway along the streambank. The slope from the roadway is generally shallow and there is not a defined outboard toe. The slope just blends into the surrounding terrain, which is relatively flat, with maybe a slight downward slope away from the bank of the creek.

Between approximately Stations 120+00 and 124+20, the streambank slope on the inboard side of the "levee" is very steep, with

☒ Continued at end of report

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

low flow in bottom of channel.

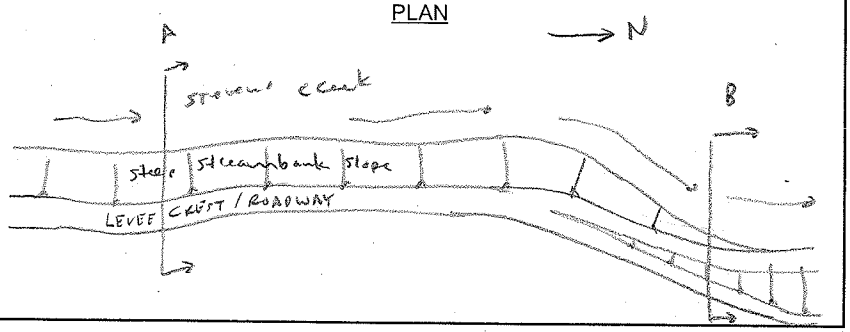
☐ Continued at end of report

Right (East) Bank Station Interval | Other Reach/Location ID

From: 120+00 To: 126+80

SKETCHES

PLAN

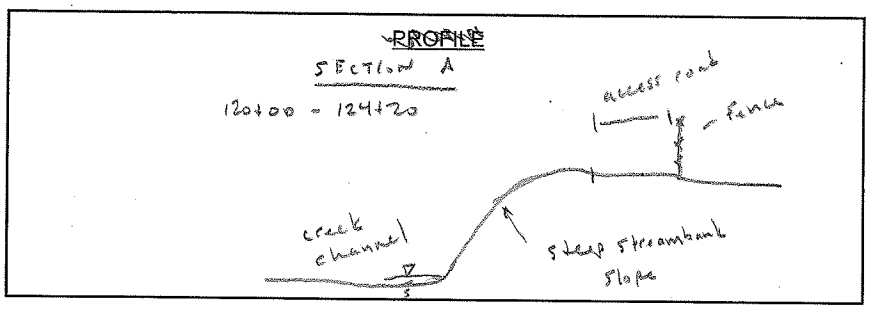


NOTES

~~PROFILE~~

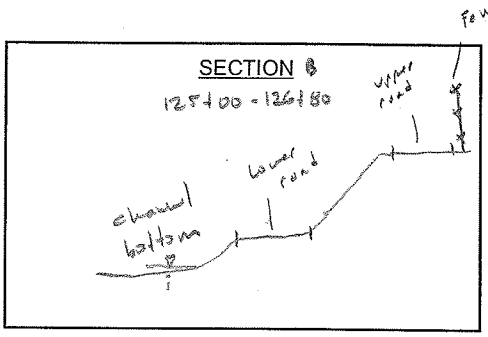
SECTION A

120+00 - 124+20



SECTION B

125+00 - 126+80



OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe
	☐ **Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐
a)	☒ **Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☐	☐	☒
b)	☒ **Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐	☐	☒
	☐ **Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	☐	☐
c)	☒ **Encroachments by vegetation or other improvements**	☐	☐	☐
d)	☒ **Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐ X	☐	☐
	☐ **Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐ X	☐	☐
	☐ **Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐
	☒ **Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☒	☐	☐
e)	☒ **Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐	☒	☐
f)	☒ **Animal burrows**	☒	☐	☐

Further describe the location, extent and nature of checked items:

a,b) Sta. 120+00 - 124+20: Very steep streambank slopes w/ erosion/undercutting at toe and shallow sloughing/sliding from above. Worst area is between about Stations 121+00 and 123+00.

c) Sta. 120+00 to 124+20: Trees and shrubs on streambank slopes. Some trees are undermined and may not be stable.

d) 124+20 - 126+80: Grass/weeds on inboard slope are tall and thick

☒ Continued at end of report

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, continued:

Slopes generally greater than 45° and some near-vertical slopes. The step / bank of the high-flow channel in this area is about 10 to 15 feet high. The streambank is moderately to heavily vegetated with trees and shrubs. One very large tree has fallen across the channel at about Sta. 122+50, leaving a crater in the channel slope. Channel slopes look generally unstable with overdeepening by erosion at the toe and shallow sloughing/sliding of material from above.

Downstream from Sta. 124+20, the channel widens and appears to have been mechanically shaped. The inboard bank slope is relatively steep (≈ 35°), but appears to be stable. Vegetation on the slope is thick grass and weeds, with no trees. A lower access road runs along the inboard toe of the high-flow stream bank.

One 15" / Storm Drain outfall was observed at Sta. 125+30. No flap or backflow prevention device observed at outfall. The outfall does include a concrete apron / splash pad.

Observations, continued:

e) 120+00 to 124+20: Channel is heavily vegetated w/ overhanging trees. One large tree has fallen across the channel at about Sta. 122+50.

f) Slight to moderate burrow activity observed on inboard and outboard sides of access road.

PROJECT NUMBER: 13815.002.0 PAGE 4 OF 4

Right (East) Bank | Station Interval From: 120+00 To: 126+80 | Other Reach/Location ID

PHOTOS

Photo ID	Location	Description
77	120+50	Steep streambank slope (≈ 10-15 ft. high) N. view
78, 79	121+00	Erosion/caving of bank slope N/S views
80 - 83	121+50	Steep bank slope and channel N. views (80, 81), S. views (82, 83)
84, 85	121+50	N. views of inboard/outboard slopes
86, 87	121+20	Steep streambank slopes (N/S)
88	122+30	" " " (N)
89 - 91	122+50	Fallen tree across channel S. view of inboard slope and
92 - 94	123+00	N/S views of outboard slopes
95, 96	124+00	downstream (N) views
97	125+00	upstream view
98	125+00	outfall and concrete apron
99	125+30	upstream view
100	125+30	cmp outfall
101	124+90	Gopher hole on outboard side of access road
102 - 105	126+00	N/S views of inboard/outboard slopes
106	125+30	Storm sewer manhole

SURVEY POINTS

Point ID	Location	Description
5	125+30	15" cmp outfall
6	125+30	5D Manhole

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/29/08
Project Number: 13815.002.0
Weather Conditions: Partly cloudy, mild ~70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Right (Earth) Bank
Station Interval From: 126+80 To: 142+50
Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

Means of Measurement/Estimation

Height above Outboard Toe:	n/a	ft (Flood wall)	☐ Visual	☐ Rod and Hand Level	☐ Other		
Crest Width:	n/a	ft	☐ Visual	☐ Pace ☐ Tape	☐ Other		
Shaped Streambank ~~Inboard~~ Slope:	30-35	(deg) H:V %	☐ Visual	☒ Brunton Compass	☐ Other		
Outboard Slope:	n/a	deg H:V %	☐ Visual	☐ Brunton Compass	☐ Other		

☐ Erosion Protection	Type:		Location:	Condition:	
☒ Penetrations	Type:	20", 24" CMP	Location: 128+80, 136+50	Condition:	good
☒ Floodwall	Type:	Concrete, 1 to 8 ft. high	Location: 126+80 – 142+50	Condition:	good
☐ Other Structures	Type:		Location:	Condition:	

Ground Cover:

	Inboard Slope	Outboard Slope (Base of wall (outboard))	~~Crest~~ (Road to base of wall (inboard))	Comments
Bare Ground	☐	☐	☐	
Grass + Weeds	☒	☒	☐	
Shrubs	☐	☐	☐	
Trees	☐	☐	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☒	
Pavement	☐	☐	☐	
Other	☐	☐	☐	

Additional Explanation/Notes:

The "levee" along this reach is a concrete floodwall. On the outboard side of the flood wall, the ground surface is relatively flat (i.e. there is no "outboard slope"). On the inboard side of the levee, there is an approximately 12-foot wide, gravel-surfaced road. A shaped, high-flow channel slope, approximately 5 to 15 feet high, ~~runs~~ is on the inboard side of the road. The shaped slope is about 30-35 degrees. A second, gravel-surfaced road runs along the base of the shaped streambank slope. The channel in this area is relatively wide and split, with a line of higher ground and trees running down the middle of the channel.

☒ Continued at end of report

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

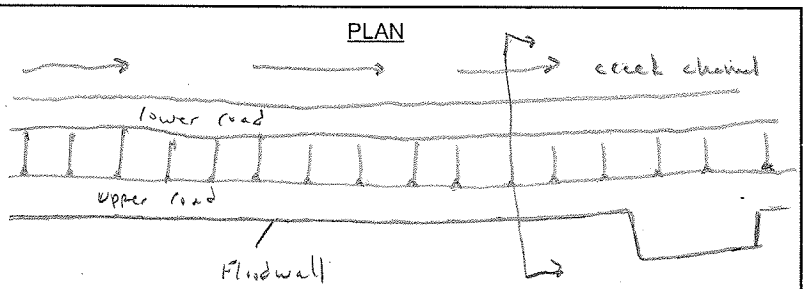
Low flow in the bottom of the channel

☐ Continued at end of report

Right (East) Bank	Station Interval	Other Reach/Location ID
	From: 126+80 To: 142+50	

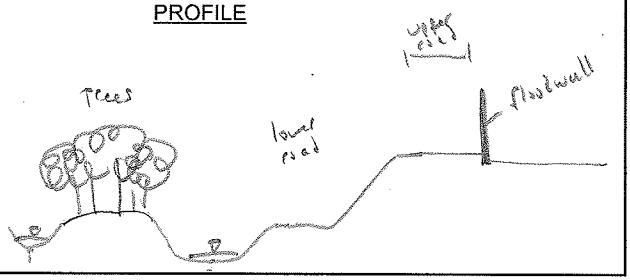
SKETCHES

PLAN



NOTES

PROFILE



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight		Moderate	Severe
	☐ **Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐		☐	☐
a)	☒ **Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☒		☐	☐
b)	☒ **Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐	X	☐	☐
	☒ **Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	X	☐	☐
	☐ **Encroachments by vegetation or other improvements**	☐		☐	☐
c)	☒ **Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐	X	☐	☐
	☐ **Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐		☐	☐
	☐ **Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐		☐	☐
d)	☒ **Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control) (?)	☒	?	☐	☐
	☐ **Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐		☐	☐
e)	☒ **Animal burrows** – Gopher activity at base of floodwall.	☐		☐ X	☐

Further describe the location, extent and nature of checked items:

a) Minor erosion observed at toe of high-flow streambank slope, may be related to vehicle traffic on lower access road (wheel ruts).

b) Line of longitudinal ground cracks up to ± 1/4" wide observed along crest of high-flow streambank slope (edge of access road) between stations ~~132+00~~ 132+00 and 134+00. High-flow streambank slope is relatively steep (>30°).

c) Grasses/weeds on streambank slope are thick and heavy. Animal burrows along floodwall (see (e)).

☒ Continued at end of report

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, Continued:

Floodwall: The floodwall ranges from about 1 to 8 feet in height and appears to be in relatively good condition. The concrete wall is cracked in many places, but the cracks are generally fine w/ and closed. Most are relatively vertical and occur at regular intervals. None appear to indicate concentrated structural movement or distress.

A monitoring well (labeled MCH-9uA) was observed on the outboard side of the floodwall near station 129+80.

Several storm drain manholes were also observed behind the wall (see photos).

Two storm drain outlets (20" and 24" CMP) observed at stations 128+80 and 136+50. Neither has a flap gate. Unable to observe any backflow prevention devices (maybe in manholes on outboard side of wall?).

Observations, Continued:

d) No backflow control observed on outfalls. Further investigation needed to check presence/condition.

e) Moderate to severe gopher activity on outboard side of floodwall, with some holes right up against the base of the floodwall. Some gopher holes (none active) also observed at inboard base of floodwall. Not clear that go under the wall, but may be a possibility depending on depth/configuration of the wall footing. Holes could represent a potential flow path under the wall that may lead to piping/erosion.

Right (East) Bank | Station Interval From: 126+80 To: 142+50 | Other Reach/Location ID

PHOTOS

Photo ID	Location	Description
107	141+00	Back side of floodwall
108, 109	131+00	Back side of floodwall
110, 111	127+00	" " " "
112	128+80	Storm drain manhole / grate
113, 114	128+80	Back of floodwall
115	129+80	Monitoring Well
116, 117	133+00	Back of flood wall
118, 119	137+00	" " " "
120, 121	139+00	" " " " - Typical Crack
122, 123	141+00	Back of flood wall
124, 125	137 (+/-)	Overgrown manhole (unmarked) @ base of wall
126-128	136+50	24" SD outfall + concrete apron
129-131	128+80	20" SD outfall + conc. apron
132, 133	128+80	~~Up~~ downstream / upstream channel (N|S views)
134	126+80	Begin Floodwall
135, 136	130+00	N|S view of streambank slope
137, 138	130+50	Top of floodwall (N|S)
139, 140	132+00	Top of floodwall (N|S)
141-143	132+00 - 132+50	Ground Cracks along crest of streambank slope
144, 145	134+00	Creek bank slope ~~(upstream/downstream)~~ (N|S)

SURVEY POINTS

Point ID	Location	Description
7	128+90	Storm drain inlet
8	128+80	Storm drain manhole
9	129+80	Monitoring Well MCH-9UA
10	137 (+/-)	Unmarked, overgrown manhole
11	126+80 - 142+50	Flood Wall
12	136+50	24" SD outfall (~~invert~~ 30" above invert)
13	128+80	20" SD outfall
146, 147	135+00	Front of Floodwall (N|S)
148, 149	140+00	Upstream / downstream channel
150	140+00	Old gopher burrow (?) at base of floodwall
151, -153	142+50	End Floodwall (N|S views)
154	132+70	Gopher burrow at ~~pp~~ base of floodwall

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/29/08
Project Number: 13815.002.0,
Weather Conditions: Partly Cloudy, Mild, 270°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Right (East) Bank **Station Interval** (Crittenden Lane) **Other Reach/Location ID**
From: 142+50 To: 169+50

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation				
Height above Outboard Toe:	10 - 18	ft	☐ Visual	☒ Rod and Hand Level	☐ Other		
Crest Width:	12	ft	☐ Visual	☐ Pace	☒ Tape	☐ Other	
Inboard Slope:	29-32	(deg) H:V %	☐ Visual	☒ Brunton Compass		☐ Other	
Outboard Slope:	26 - 30	(deg) H:V %	☐ Visual	☒ Brunton Compass		☐ Other	

☒ Erosion Protection	Type: Riprap	Location: 168+50 - 169+50	Condition:	okay / steep slope
☒ Penetrations	Type: 12" cmp w/ flap (outfall)	Location: 159+20	Condition:	good
☐ Floodwall	Type:	Location:	Condition:	
☒ Other Structures	Type: Crittenden Lane Bridge	Location: 169+50	Condition:	N/A
☒ Utilities	Fiber optic	169+50		

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☐	
Grass/weeds	☒	☒	☐	
Shrubs	☐	☐	☐	
Trees	☐	☐	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☒	Gravel trail / access road
Pavement	☐	☐	☐	
Other	☐	☐	☐	

Additional Explanation/Notes:

Relatively uniform levee configuration in this reach. Gravel access roads on top of levee and at toe of inboard levee slope. Low-flow channel is split, with a tree-lined strip of higher ground running down the middle of the channel. Low-flow channel is heavily vegetated w/ shrubs and trees, some debris.

One outfall (12" diam cmp) observed near Sta. 159+20. The outfall has a flap gate at the end that appears to be in working order.

☒ Continued at end of report

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

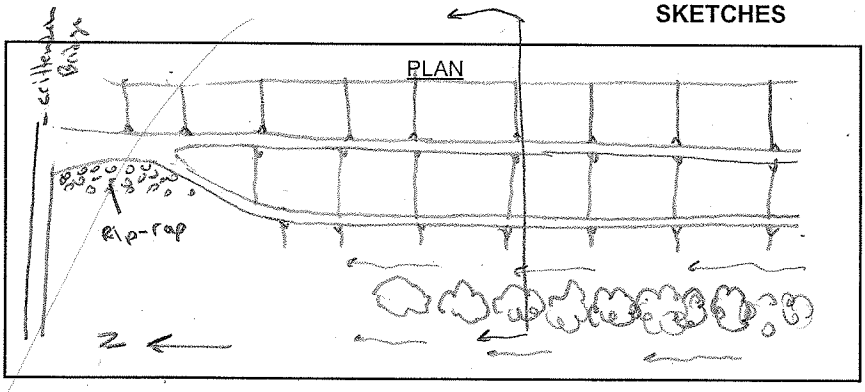
Low flow in creek channel. Flow in channel appears to become tidally influenced (transition zone) between about Stations 145+00 and 155+00.

☐ Continued at end of report

Right (East) Bank | Station Interval From: 142+50 To: 169+50 | Other Reach/Location ID

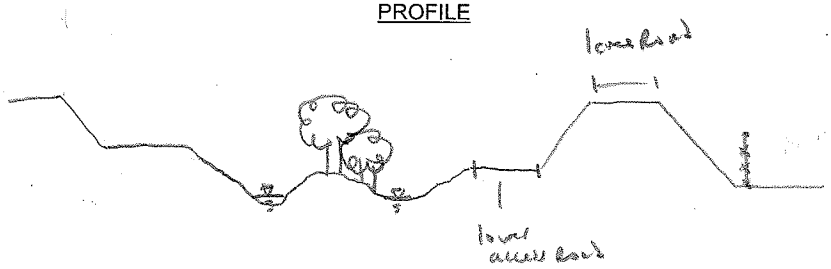
SKETCHES

PLAN



NOTES

PROFILE



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe
	☐ **Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐
	☒ **Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☒	☐	☐
a)	☒ **Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☒	☐	☐
	☐ **Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	☐	☐
	☐ **Encroachments by vegetation or other improvements**	☐	☐	☐
	☒ **Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☒	☐	☐
	☐ **Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐	☐	☐
	☐ **Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐
	☐ **Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐	☐	☐
b)	☒ **Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☒	☐	☐
c)	☒ **Animal burrows**	☐	☒ to	☒

Further describe the location, extent and nature of checked items:

a) Sta. 168+00 - 169+50 Steep riprap slope upstream of Crittenden Lane bridge abutment. May also be an erosion/scour issue with concentrated flows in area of bridge. Level of protection may not be sufficient for major flood flows. erosion

b) Minor debris in low-flow channel (Sta. 150+00)

c) Areas of moderate to severe ground squirrel burrow activity on outboard levee slope. Occasional large burrows with a few areas of severe activity, particularly between about Stations 146+00 and

☒ Continued at end of report

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Descriptions, continued:

The outfall was discharging water at the time it was observed. ~~countercop~~ It looks like there is a manhole/access for the outfall on the opposite side of the levee on NASA property (not accessible).

The inboard levee slope is covered with riprap beginning about 100 ft. upstream of the Coffeetown Lane bridge. The riprap slope is very steep (>45°). The high-flow channel narrows significantly in the approximately 300 ft upstream from the bridge, which may act as a choke-point during high flow periods.

~~Also~~ Manhole and markers indicate a fiber-optic (communications) utility crossing beneath ~~the~~ both levees and the creek channel near the bridge.

Observations, continued:

152+00. Most activity on outboard slope appears to be ground squirrels, with relatively large (>3" diam) burrows. Burrows also appear to be causing localized erosion along the embankment.

Only slight burrowing activity observed on the inboard slope, mostly ~~gopher~~ smaller gopher holes.

Right (East) Bank | Station Interval From: 142+50 To: 169+50 | Other Reach/Location ID:

PHOTOS

Photo ID	Location	Description
155-158	169+20	12" cmp storm drain outfall
159, 160	143+00	N/S views of low-flow channel
161, 162	143+00	N/S views of high-flow channel / access road, levee slope
163, 164	144+00	N views of inboard / outboard slopes
165	146+70	Large ground squirrel burrow on outboard slope
166	147+80	" " " burrows " " "
167	148+90	" " " " " " "
168 - 171	150+00	N/S views of inboard / outboard levee slopes
172, 173	150+00	Debris in low-flow channel
174, 175	150+00	Inboard levee slope (N/S)
176	151+50	Area of severe burrowing
177, 178	159+20	Vault / manhole opposite outfall (not accessible)
179	159+20	outfall
180-183	159+00	N/S views of inboard / outboard slopes
184, 185	159+00	N/S views of high-flow channel
186, 187	159+00	" " " low-flow channel
188 - 191	169+50	S views from Crittenden Rd. Crossing
192 - 194	168+50	Crittenden Lane Bridge and Riprap Slope
195	169+00	Riprap slope from opposite bank

SURVEY POINTS

Point ID	Location	Description
14	169+20	50 outfall

STEVENS CREEK WEST LEVEE

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/29/08
Project Number: 13815.002.0
Weather Conditions: Partly Cloudy, Mild ≈ 70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Left (West) Bank
Station Interval From: 111+00 To: 113+50
Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation		
Height above Outboard Toe:	3 ft	☒ Visual	☐ Rod and Hand Level	☐ Other	
Crest Width:	20 - 50 ft	☒ Visual	☐ Pace ☐ Tape	☐ Other	
Inboard Slope:	10 - 20 deg H:V %	☒ Visual	☐ Brunton Compass	☐ Other	
Outboard Slope:	25 - 30 deg H:V %	☒ Visual	☐ Brunton Compass	☐ Other	

☒ Erosion Protection	Type:	Riprap and concrete sacks	Location:	112+00 - 113+00	Condition:	Fair - good
☐ Penetrations	Type:		Location:		Condition:	
☐ Floodwall	Type:		Location:		Condition:	
☒ Other Structures	Type:	Concrete channel / retaining wall / bicycle trail High voltage electrical tower (111+20)	Location:	111+00 - 112+00	Condition:	good

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☒	☒	☐	
Grass	☐	☐	☐	
Shrubs	☒	☒	☐	
Trees	☒	☒	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☒	
Pavement	☐	☐	☒	
Other	☐	☐	☐	

Additional Explanation/Notes:

In this reach, the "levee" is a relatively wide strip of ground between a landscaped park area and the Stevens Creek channel. As described for the levee on the opposite bank, the channel in this area is relatively complex and includes an approximate open concrete channel at the downstream end of the culvert beneath Highway 101 that discharges through a drop structure into a heavily vegetated "natural" channel. The slopes of the natural channel are relatively steep, but are offset from the levee on this side of creek by ~~a~~ bicycle path that runs through the culvert beneath Highway 101.

☐ Continued at end of report

SURFACE WATER CONDITIONS

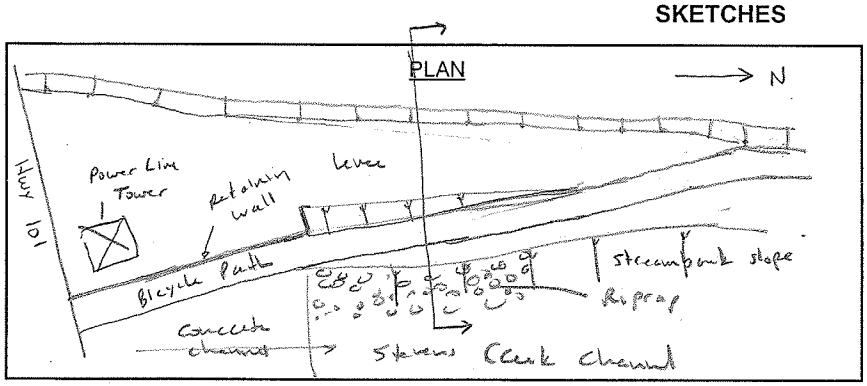
Flow conditions and water levels on the inboard side of the levee:

Low flow in the bottom of the creek channel.

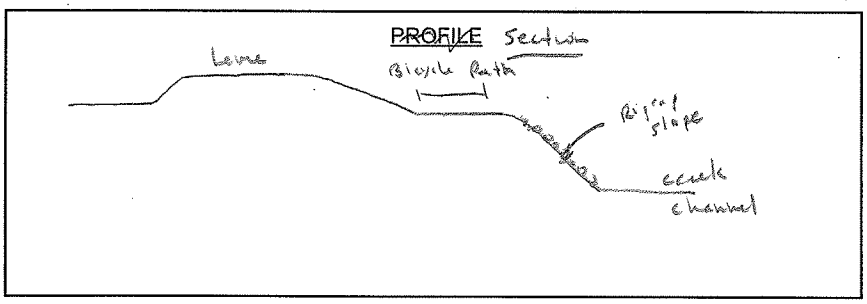
☐ Continued at end of report

Left (West) Bank Station Interval	Other Reach/Location ID
From: 111+00 To: 113+50	

SKETCHES



NOTES



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe
☐	**Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐
☐	**Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☐	☐	☐
☐	**Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐	☐	☐
☐	**Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	☐	☐
a) ☒	**Encroachments by vegetation or other improvements** (Eucalyptus Trees)	☐ X	☐	☐
☐	**Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐	☐	☐
☐	**Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐	☐	☐
☐	**Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐
☐	**Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐	☐	☐
b) ☒	**Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐	☐ X	☐
☐	**Animal burrows**	☐	☐	☐

Further describe the location, extent and nature of checked items:

a) Trees / shrubs on inboard / outboard slopes and crest. from approx Sta. 112+50 North.

b) Heavily vegetated channel w/ trees and debris across channel (see discussion for opposite levee).

☐ Continued at end of report

Left (West) Bank | Station Interval: From: 111+00 To: 113+50 | Other Reach/Location ID:

PHOTOS

Photo ID	Location	Description
1	111+00	Looking across levee toward creek channel
2	111+00	Levee crest (N. view)
3	111+00	Creek channel (N view)
4, 5	112+00	outboard slope (N/S views)
6, 7	112+00	Crest (N/S views)
8 - 11	113+00	N/S views of inboard/outboard slopes
12	112+00	Retaining Wall (111+00 - 113+00)
13	111+00	Concrete channel (N view)
14	112+00	Concrete channel (S. view)
15	112+50	Concrete bank slope (N. view)
16	113+00	riprap ~~slope~~ streambank slope (S. view)
17	113+00	Vegetated channel (N. view)
18	113+50	Levee / streambank (S. view)

SURVEY POINTS

Point ID	Location	Description

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/30/08
Project Number: 13815.002.0
Weather Conditions: cloudy, cool ≈ 60°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Station Interval From: 113+50 To: 120+00

Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation				
Height above Outboard Toe:	3-5	ft	☒ Visual	☐ Rod and Hand Level		☐ Other	
Crest Width:	12-14	ft	☐ Visual	☐ Pace	☒ Tape	☐ Other	
Inboard Slope:	30	(deg) H:V %	☐ Visual	☒ Brunton Compass		☐ Other	
Outboard Slope:	25-30	(deg) H:V %	☐ Visual	☒ Brunton Compass		☐ Other	

☒ Erosion Protection	Type:	Concrete sacks / riprap on channel slopes	Location:	118+50 – 120+00	Condition: fair – good
☐ Penetrations	Type:		Location:		Condition:
☐ Floodwall	Type:		Location:		Condition:
☒ Other Structures	Type:	drop structures in channel	Location:	119+00	Condition: good
☒ utilities		High Voltage Electrical Towers Irrigation System / Piping		118+50	

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☐	
Grass	☒	☐	☐	
Shrubs	☒ } occasional	☒ } thick, heavy	☐	
Trees	☒	☒	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☐	
Pavement	☐	☐	☒	A/C Bicycle Trail
Other	☐	☐	☐	

Additional Explanation/Notes:

The levee in this reach is built up approximately 3 to 5 feet above the elevation of the outboard toe. A thickly vegetated drainage swale runs along the outboard toe of the levee. The landscaped ground surface on the opposite side of the swale rises to only a foot or two below the elevation of the crest. Between about Stations 114+00 and 117+00, the inboard levee / streambank slope descends around approximately 20 to 25 feet to a relatively wide lower bench adjacent to the low-flow channel. Between about Stations 117+00 and 120+00, the inboard levee slope

☒ Continued at end of report

SURFACE WATER CONDITIONS

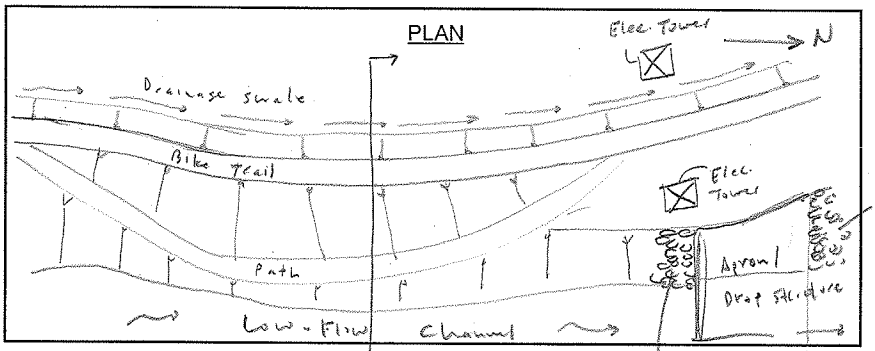
Flow conditions and water levels on the inboard side of the levee:

low flow in bottom of creek channel

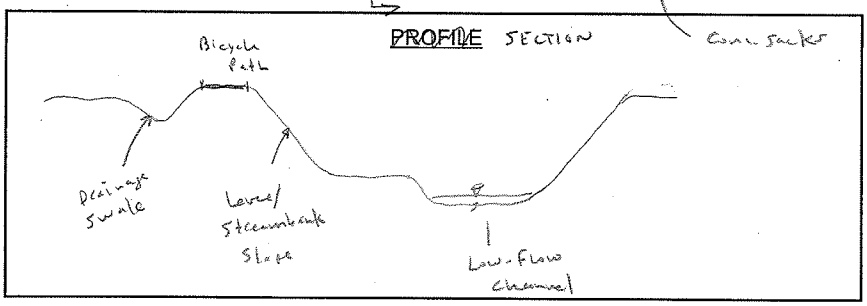
☐ Continued at end of report

Left (West) Bank | Station Interval: From: 113+50 To: 120+00 | Other Reach/Location ID:

SKETCHES



NOTES



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe
☐	**Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐
☐	**Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☐	☐	☐
a) ☒	**Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☒	☐	☐
a) ☒	**Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐ X	☐	☐
b) ☒	**Encroachments by vegetation or other improvements** (Existing Trees (@ Irrigation))	☐	☒	☐
c) ☒	**Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐ X	☐	☐
☐	**Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐	☐	☐
☐	**Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐
☐	**Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐	☐	☐
a) ☒	**Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐	☐ X	☐
☐	**Animal burrows**	☐	☐	☐

Further describe the location, extent and nature of checked items:

a) Minor longitudinal cracking in Trail pavement between Station 114+00 and 117+00. May be related to adjacent, ~~not~~ relatively high and steep (30°), levee / streambank slope. (Minor slope creep / movement?)

b) Heavy vegetation on outboard slope. Most of slope is obscured.

c) Tall / thick grass and weeds on inboard slope. Heavy ~~veg~~ vegetation / debris in channel.

☒ Continued at end of report

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, Continued:

descends several feet to an approximately 20- to 30- foot wide bench. The streambank slope then descends from the bench to the low-flow channel. A high voltage electrical tower is located on the bench between Stations 118+50 and 119+50. A second tower is located in the drainage swale on the outboard side of the levee at the same location.

Between Stations 118+50 and 120+00, the creek channel passes through a concrete drop/apron structure (for about 50 feet) (see description in discussion of the levee on the opposite bank). Upstream of the structure, the streambank slopes are covered by a concrete-sack facing. Downstream of the structure, (for about 50 feet) streambank slopes are covered with riprap material.

Between about Stations 117+00 and 120+00, the levee crest elevation drops approximately 7 feet. A similar drop, corresponding with the location of the drop structure in the channel, was noted in the levee on the opposite bank.

The low-flow channel in this reach is heavily vegetated with trees that overhang the channel. Some debris noted in the channel.

An irrigation system (valve/control boxes and piping) was observed in the outboard levee slope along the entire reach.

Observations, Continued

d) Heavy vegetation in low-flow channel, w/ overhanging tree branches and debris. (See discussion of levee on opposite bank for further description of channel conditions.)

Left (West) Bank | Station Interval From: 113+50 To: 120+00 | Other Reach/Location ID

PHOTOS

Photo ID	Location	Description
19 - 21	114+00	outboard, crest, inboard slopes, N view
22	115+00	Irrigation boxes on outboard slope (also note longitudinal cracking in pavement)
23, 24	117+20	N/S views of ~~outboard~~ outboard slope
25, 26	117+20	Drainage swale (N/S views)
27, 28	118+00	N/S views of inboard slope
29	117+00	Streambank slope (S. view)
30, 31	116+00	low-flow channel (N/S views)
32, 33	115+00	N. views of streambank slope and low flow channel
~~32~~ 34	118+20	N. view of outboard slope
35	119+20	S. view of inboard slope
36 - 40	119+50	Drop structure, apron, and channel protection from opposite bank
~~40~~	~~opposite~~	
41, 42	119+50	overgrown riprap slope
43, 44	120+00	N/S views of crest

SURVEY POINTS

Point ID	Location	Description

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 5/30/08
Project Number: 13815.002.0
Weather Conditions: Partly Cloudy, mild ≈ 65°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Left (West) Bank
Station Interval From: 120+00 To: 130+30
Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation		
Height above Outboard Toe:	0 - 2 ft	☒ Visual	☐ Rod and Hand Level	☐ Other	
Crest Width:	12 - 15 ft	☐ Visual	☐ Pace ☒ Tape	☐ Other	
Inboard Slope:	30 - 35 (deg) H:V %	☐ Visual	☒ Brunton Compass	☐ Other	
Outboard Slope:	< 20 (deg) H:V %	☒ Visual	☐ Brunton Compass	☐ Other	

☒ Erosion Protection	Type: Riprap and Concrete Sack	Location: ≈ 125+00 - 127+00	Condition:	okay, overgrown
☒ Penetrations	Type: 48" Storm Drain w/ flap gate	Location: 126+50	Condition:	okay, some debris
☒ Floodwall	Type: Concrete Sack, ≈ 12-18" high	Location: 126+00 - 126+80	Condition:	good
☐ Other Structures	Type:	Location:	Condition:	
☒ Utilities	Electric Tower Irrigation	127+00 120+00 - 130+00		

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☐	
Grass	☒	☐	☐	
Shrubs	☒ occasional	☒ Thick, heavy growth	☐	
Trees	☒ occasional	☒ Thick, heavy growth	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☐	
Pavement	☐	☐	☒ A/C	Bicycle Trail
Other	☐	☐	☐	

Additional Explanation/Notes:

This reach is similar to the previous one, with the exception that the "levee" is very low and almost ~~not~~ non-existent in some areas. From ~~Station~~ 120+00 to 126+00 and 127+00 to 130+30, a ~~drainage~~ shallow, ~~dense~~ thickly vegetated drainage swale runs along the outboard toe. From about Sta. 120+00 to 125+00, ~~Station~~ a relatively steep (30°-35°) levee/streambank slope runs along the inboard side of the bicycle trail / crest. There is a wide, relatively flat bench between the base of the streambank slope and the low-flow channel. Between about stations 120+00 and 124+00, the low flow

☒ Continued at end of report

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

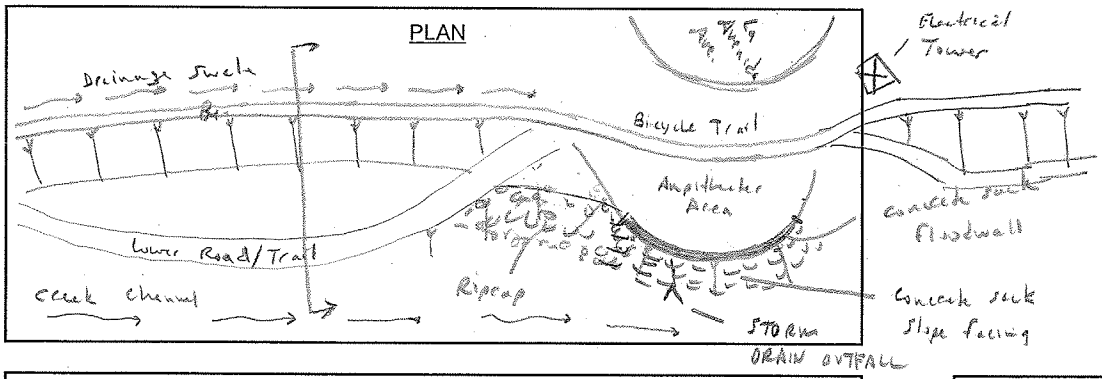
Low flow in bottom of creek channel

☐ Continued at end of report

Left (West) Bank	Station Interval	Other Reach/Location ID
	From: 120+00 To: 130+30	

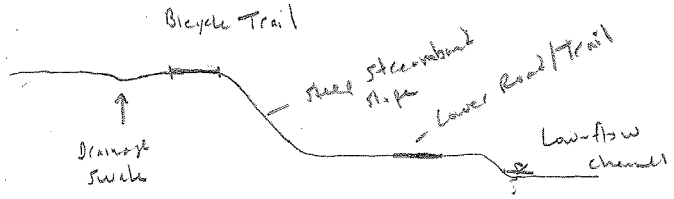
SKETCHES

PLAN



NOTES

PROFILE SECTION



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight		Moderate	Severe
☐	**Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐		☐	☐
☐	**Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☐		☐	☐
a) ☒	**Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐	X	☐	☐
☒	**Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	X	☐	☐
b) ☒	**Encroachments by vegetation or other improvements** (Electrical Towers, Irrigation)	☐		☒	☐
c) ☒	**Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐	X	☐	☐
☐	**Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐		☐	☐
☐	**Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐		☐	☐
☐	**Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐		☐	☐
d) ☒	**Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐		☒	☐
☐	**Animal burrows**	☐		☐	☐

Further describe the location, extent and nature of checked items: and 128+00 to 130+30

a) Sta. 121+00 to 125+00, inboard slope is relatively high (≈ 10-15 ft.) and steep (30°-35°). Longitudinal cracks noted in trail pavement along this reach. Mostly minor cracking, with some moderate ~~cracks~~ (open) cracks between Sta of Lois 121+00 and 122+00. The open cracks are generally less than 1/4" to 1/2" wide.

b) The outboard "slope" / swale area is heavily vegetated w/ trees and shrubs. The slope was largely obscured by vegetation and could not be observed in most areas.

☒ Continued at end of report

Left (West) Bank

PROJECT NUMBER: 13815.002.0 120+00 to 130+30 PAGE 3 OF 4

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, cont.

channel is heavily vegetated w/ trees that overhang the channel. (See opposite log of opposite bank for further description of channel conditions.)

Between Stations 125 + 50 and 127+00, the crest widens into an ampitheater area at the La Avenida Avenue trailhead. On the inboard side of the area, the streambank slope is covered by riprap and concrete-sack material. At the top of the slope, a line of concrete sacks forms a short (12"-18" high) floodwall along the perimeter of the ampitheater/trailhead area.

A large storm drain outfall exits at the toe of the concrete-rock slope at about Sta. 26+50. The outfall is a 78" diameter CMP pipe with a 48" diameter flap gate. The gate appears to be in working order, although some debris has collected around the gate mechanism and seal.

An electrical transmission line tower is located on the outboard side of the levee at station 127+00. Irrigation lines (valve/control boxes and piping) are also located along the outboard slope between Stations 120+00 and 126+00 (and 127+00 to 130+00). There are water lines beneath the trail in the trailhead/ampitheater area.

Observations, Cont.

c) Grass and weeds on inboard slope are thick and high. Outfall flap gate at Sta. 126+50 needs maintenance to remove debris.

d) Sta. 120+00 to 129+00: Low-flow channel is heavily vegetated with overhanging trees. Large tree has fallen across entire low-flow channel and is clogged w/ debris. (See discussion for levee on opposite bank.)

Left (West) Bank | Station Interval: From: 120+00 To: 130+30 | Other Reach/Location ID:

PHOTOS

Photo ID	Location	Description
45 - 47	126+~~00~~ 50	Storm Drain outfall (78" cmp w/ 48" flap gate)
48-50	120+00	"swale" area, outboard parking lot and landscaping (N/S)
51 - 54	120+50	N/S views of outboard/inboard slopes
55, 56	122+00	N/S views of streambank slope
57 - 60	~~Near~~ 123+00	Lower channel ~~area~~ area, N/S views
61	125+50	S. view of streambank slope
62	124+00	Swale area on outboard side
63-64	125+20	Ampitheater Area
65 - 67	126+70	~~Amp~~ ~~Top~~ Ampitheater area
68	126+00	Concrete Sack Slope + wall (N. view)
69	127+00	Ampitheater area
70-71	126+80	Concrete Sack slope + wall (S. view)
72	126+60	" " " "
73-74	125+50	Riprap and Concrete sack slope from opposite bank
75 - 77	126+50	Concrete sack slope and outfall from opposite bank
78, 79	121+20	Longitudinal cracks in pavement, N. view
80, 81	127+00	N. view of inboard slope, crest
82	128+50	~~Dam~~ Filled cracks in pavement (N. view)
83	129+90	Outboard "slope"
84, 85	130+30	S. view of inboard slope, crest

SURVEY POINTS

Point ID	Location	Description
15	126+~~00~~ 50	50 outfall (48" ø flap gate)
16	126+50	50 manhole
17	125+00 - 127+00	Top of Conc Sack slope/wall
86	126+50	outboard side of levee (behind thick hedge)
87	127+50	outboard side of levee (" " ")

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 6/2/08
Project Number: 13815.002.0
Weather Conditions: clear, mild, ≈ 70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Left (West) Bank
Station Interval From: 130+30 To: 143+00
Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation					
Height above Outboard Toe:	3-14	ft	☐ Visual	☒ Rod and Hand Level	☐ Other			
Crest Width:	12-14	ft	☐ Visual	☐ Pace	☒ Tape	☐ Other		
Inboard Slope:	28-30	(deg) H:V %	☐ Visual	☒ Brunton Compass	☐ Other			
Outboard Slope:	26-31	(deg) H:V %	☐ Visual	☒ Brunton Compass	☐ Other			

☐ Erosion Protection	Type:		Location:	Condition:	
☒ Penetrations	Type:	Storm Drain outfalls	Location:	136+40, 141+90	Condition: fair
☐ Floodwall	Type:		Location:	Condition:	
☒ Other Structures	Type:	High Voltage Electrical Towers	Location:	135+80, 142+80	Condition:

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☐	
Grass	☒	☒	☐	
Shrubs	☐	☒	☐	
Trees	☒ occasional	☒	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☐	
Pavement	☐	☐	☒ A/C	Bicycle Trail
Other	☐	☐	☐	

Additional Explanation/Notes:

The levee section is relatively uniform along this reach. A fence marking the edge of a trailer park runs along the outboard toe. A gravel-surfaced access road lower runs along the base of the inboard slope. The low-flow creek channel runs along the edge of the lower access road, which has been the edge of which has been undermined in some locations. High voltage electrical towers are located on the outboard slope near Stations 135+80 and 142+80.

☒ Continued at end of report

SURFACE WATER CONDITIONS

Flow conditions and water levels on the inboard side of the levee:

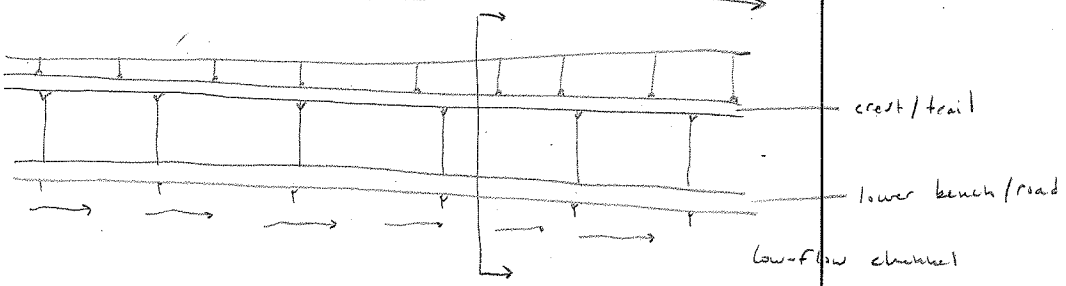
Low flow in bottom of creek channel

☐ Continued at end of report

Left (West) Bank | Station Interval From: 130+30 To: 143+00 | Other Reach/Location ID

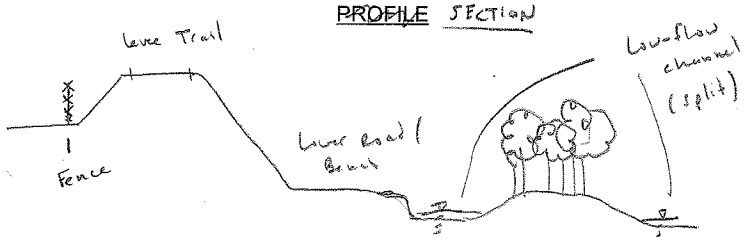
SKETCHES

PLAN



NOTES

PROFILE SECTION



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

			Slight		Moderate	Severe
	☐	**Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐		☐	☐
a)	☒	**Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☒		☐	☐
	☐	**Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☐		☐	☐
b)	☒	**Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☐	X	☐	☐
c)	☒	**Encroachments by vegetation or other improvements** (Structural Trowel)	☐	X	☐	☐
d)	☒	**Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☐	X	☐	☐
	☐	**Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐		☐	☐
	☐	**Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐		☐	☐
e)	☒	**Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐		☒	☐
f)	☒	**Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☒		☐	☐
g)	☒	**Animal burrows**	☒		☐	☐

Further describe the location, extent and nature of checked items:

a) Minor erosion along inboard edge of lower access road has undermined the edge of the road in some areas. Also minor erosion / oversteepening at the toe of the inboard slope, where traffic along the lower access road has encroached on the toe (wheel ruts).

b) Longitudinal cracks along the paved levee trail. Cracks have been patched/sealed. Cracks present along entire reach, but more common and closely spaced between Stations 130+30 and 134+00.

☒ Continued at end of report

Left (West) Bank

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, Continued:

Storm drain outfalls are located at Stations 136+40 and 141+90

136+40: outfall is a 42" cmp with 24" flap gate. W/ concrete splash pad. The outfall has been partially blocked by vegetation and debris from a tree that has fallen across the low flow channel. Above the 42" outfall, a small 6" cmp outfall penetrates the slope at about mid-height. There is no flap gate on the 6" outfall. The 6" cmp was not observed on the outboard side of the levee, but there is a vault in the trailer park lot that may house a sump that feeds the outfall.

141+90: Outfall is a 66" cmp with a 36" flap gate. The outfall has a concrete splash pad, but the outfall is near the bottom of channel elevation and the splash pad has been largely covered by sediment and vegetation. There is some vegetation around, but not blocking, the outfall pipe. A second outfall is located above the 60" outfall at about mid-slope. The second outfall includes double 10" cmps that are also observed entering at the toe of the outboard slope. There are no flap gates on the cmps. The cmps drain from a sump and pump assembly in the trailer park on the other side of the outboard fence.

Observations, Continued:

c) Tree and large shrub encroachments observed at the following locations –
Inboard Slope: Stations 131+30, 134+20, 135+50, 136+50 and 139+30
Outboard Slope: Stations 130+30 to 135+50 and Sta. 136+80

d) Grasses along inboard and outboard slopes are tall and thick. Fallen trees in channel (see f.). Outfall at Sta. 136+40 is partially blocked.

e) 42" cmp outfall near Sta. 136+40 is partially blocked by vegetation and debris. No flaps on 6" cmp outfall at 136+40 or 10" cmp outfalls at 141+90. Presence/condition of backflow prevention systems/devices not observed.

g) Minor burrow activity noted on inboard/outboard slopes. Most burrows appear inactive and many have been filled with grout.

f) Fallen Trees/debris in low-flow channel near Stations 133+00 and 136+50.

Left (west) Bank

Station Interval		Other Reach/Location ID
From: 130+30	To: 143+00	

PHOTOS

Photo ID	Location	Description
88, 89	130+30	N. view of inboard / outboard slopes
90	130+30	Pavement cracks (filled) N. view
91, 92	130+30	N/S views of inboard slope
93	130+30	Low-flow channel (N. views)
94	133+00	Fallen trees and debris in low-flow channel
95	136+50	" " " " " " "
96-98	136+40	42" cmp outfall w/ 24" flap gate
99, 100	136+40	6" cmp outfall
101, 102	136+40	Sump box opposite levee from 6" outfall
103-106	135+00	N/S views of inboard / outboard slopes
107	135+90	Fallen tree across low flow channel
108	136+40	Outfall and Concrete apron
109	136+50	Electrical tower on outboard slope
110-113	139+00	N/S views of inboard / outboard slopes
114	140	Erosion along inboard edge of lower access road
115-116	141+50	N/S views of inboard slope
117-119	141+90	60" cmp outfall w/ 36" flap gate
120	141+90	Double 10" cmp outfall
121-123	141+90	Double 10" cmp outfall on outboard side, sump
124-125	142+80	~~N/S views~~ S. views of inboard / outboard slopes
126	143+00	Electrical Tower on outboard slope.

SURVEY POINTS

Point ID	Location	Description
18	136+40	42" cmp outfall w/ 24" flap gate
19	136+40	6" cmp outfall
20	141+90	60" cmp outfall w/ 36" flap gate
21	141+90	SD outfall, Double 10" cmp culverts
22	141+90	10" cmp at outboard toe (exposed)
23	141+90	" " " " " " "

GEOMATRIX

LEVEE FIELD RECONNAISSANCE LOG

Project Name: Stevens Creek Levee Recertification
Date: 6/2/08
Project Number: 13815.002.0
Weather Conditions: sunny, mild, ~ 70°
Location: Mountain View, CA
Observations Recorded by: D. Ritzman

Left (West) Bank **Station Interval** From: 143+00 To: 169+50

Other Reach/Location ID

LEVEE DESCRIPTION

Geometry and Configuration:

			Means of Measurement/Estimation	
Height above Outboard Toe:	6-14 ft	☐ Visual	☒ Rod and Hand Level	☐ Other
Crest Width:	12-14 ft	☐ Visual	☐ Pace ☒ Tape	☐ Other
Inboard Slope:	26-30 (deg) H:V %	☐ Visual	☒ Brunton Compass	☐ Other
Outboard Slope:	26-30 (deg) H:V %	☐ Visual	☒ Brunton Compass	☐ Other

☒ Erosion Protection	Type: Riprap on inboard slope	Location: 168+50 - 169+50	Condition:	fair, see notes
☒ Penetrations	Type: Storm Drain outfalls	Location: 155+20, 159+50	Condition:	See notes
☐ Floodwall	Type:	Location:	Condition:	
☒ Other Structures	Type: Electrical Towers	Location: see notes	Condition:	
☒ Utilities	Type: Irrigation Lines, Electrical Lines (overhead and underground)	Location: 143+00 - 150+00 (outboard slope), 143+00 - 169+50	Condition:	

Ground Cover:

	Inboard Slope	Outboard Slope	Crest	Comments
Bare Ground	☐	☐	☐	
Grass	☒	☒	☐	
Shrubs	☐	☐	☐	
Trees	☐	☐	☐	
Riprap	☐	☐	☐	
Gravel	☐	☐	☐	
Pavement	☐	☐	☒ A/C	Bicycle Trail
Other	☐	☐	☐	

Additional Explanation/Notes:

The levee section is relatively uniform along this reach. A gravel road / driveway that serves a tree nursery is located along the outboard toe. A gravel-surfaced access road is located along the inboard toe. The low-flow stream channel runs along the inside edge of the lower access road. High voltage electrical line towers are located on the outboard slope near Stations 145+00, 151+00, 159+00 and 168+00. Observed two outfalls, one at station 155+20 and one at station 159+50.

☒ Continued at end of report

SURFACE WATER CONDITIONS

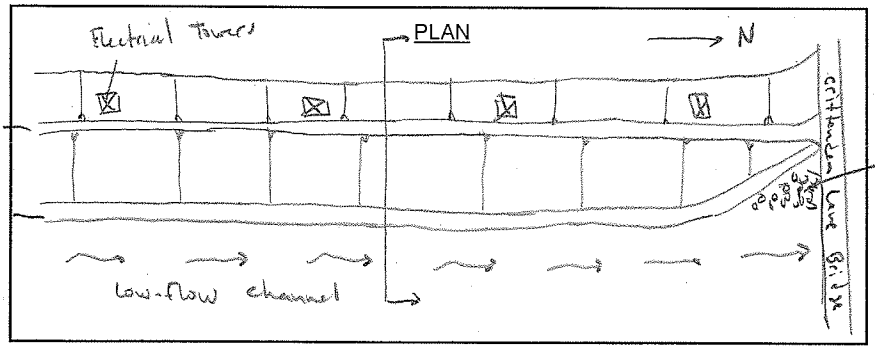
Flow conditions and water levels on the inboard side of the levee:

Low flow in bottom of creek channel.

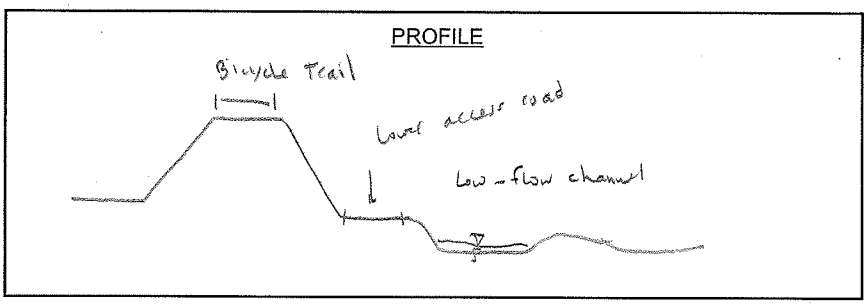
☐ Continued at end of report

Left (West) Bank	Station Interval	Other Reach/Location ID
	From: 143+00 To: 169+50	

SKETCHES



NOTES



SECTION

OBSERVATIONS

Check and indicate severity of all that apply:

		Slight	Moderate	Severe
	☐ **Evidence of settlement** (i.e., surface cracks, sinkholes, hummocky/undulating ground)	☐	☐	☐
a)	☒ **Erosion** (rills, gullies, undercutting of levee slopes, scour, etc.)	☒	☐	☐
b)	☒ **Evidence of potential slope stability problems** (as indicated by steep and/or undercut slopes, surface cracks, caving, bulging, slumping, or irregular ground surfaces, etc.)	☒	☐	☐
g)	☒ **Other ground deformation/cracking** (not obviously related to settlement, erosion, or instability)	☒	☐	☐
c)	☒ **Encroachments by vegetation or other improvements** (Nursery operations, Electric Towers)	☐	☒	☐
d)	☒ **Inadequate maintenance** (i.e, mowing/vegetation control, inoperable control structures, etc.)	☒	☐	☐
	☐ **Evidence of potential structural problems** (walls, abutments, weirs, aprons, etc.)	☐	☐	☐
	☐ **Evidence of seepage** (e.g., wetland-type vegetation, moist or wet ground, springs, boils, etc.)	☐	☐	☐
e)	☒ **Damaged, distressed, and/or blocked closures or interior drainage structures** (including gates, flaps, and/or other devices for backflow control)	☐	☐ X	☐
	☐ **Adverse channel conditions** (i.e., blockages, excessive debris, sand/gravel bars, etc.)	☐	☐	☐
f)	☒ **Animal burrows**	☒	☐	☐

Further describe the location, extent and nature of checked items:

a) Slight erosion / potential for erosion noted in the following areas:
- oversteepening/erosion at toe of inboard slope, where traffic on the lower access road has driven along the toe (wheel ruts)
- similar erosion/oversteepening at the outboard toe where traffic and nursery operations have caused disturbance
- Minor erosion observed along the inboard side of the lower access road. In a few areas, the edge of the access road is slightly undermined
- Minor erosion/scour around the edges of the outfall apron at sta. 159+50. Also some erosion in the channel in the outfall splash area.

☒ Continued at end of report

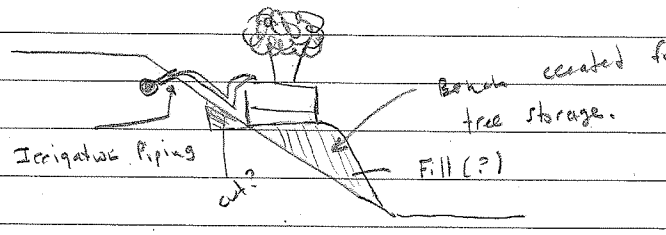
DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, Continued:

Outfall, sta. 155+20: Outfall is an 84" cmp with 48" flap gate. The outfall and flap gate are half-buried in sediment. The outfall is inoperable overgrown w/ thick grass and due to the sediment. The inlet for the gravity-flow outlet was observed on the opposite side of the levee. The 48" cmp inlet has a layer of soil and garbage in the bottom of the pipe. The outfall has no apron or other erosion protection at the outlet.

Outfall, sta. 159+50: Outfall is a 24" diameter steel pipe with a heavy metal grate and a concrete splash pad/apron. The outfall is operational with periodic discharges observed. The inlet/source was not observed. There is no flap gate on the outfall. From the splash pad across the lower access road, discharge flows run down a concrete apron into the low-flow channel. Discharges have eroded a basin in the channel and appear to have slightly undermined the edge of the apron where it meets the channel.

Between Stations 143+00 and 148+00, the outboard slope has been graded to prepare a flat bench to support containerized trees as part of the nursery operation. The bench is several feet wide and appears to have been constructed by placing fill against the slope. In some areas, it looks like there may have been some cut as well, but this may be due to erosion as a result of the cutter along the toe of the slope as well.



Between Stations 143+00 and 150+00, it appears that plastic irrigation piping has been installed along the crest of the outboard slope. The piping appears to include a PVC trunk line buried parallel to the crest with occasional laterals that deliver water to containerized trees stored on the bench described above.

Left (West) Bank

PROJECT NUMBER: 13815.002.0 143+00 to 169+50 PAGE 4 OF 5

DESCRIPTIONS AND OBSERVATIONS, CONTINUED

Description, continued:

Approximately 300 feet upstream from the Crittenden Lane bridge, the channel narrows and the lower access road rises to merge with the levee crest road/trail. From about station 168+50 to 169+50 (the bridge abutment), riprap covers the relatively steep inboard slope. The bridge area creates a constriction of the channel. See the log of the opposite (East) levee for discussion of channel conditions in this area.

A buried, high-voltage electrical line appears to run beneath the driveway/roadway about 20 to 40 feet outside the toe of the outboard slope. The line is marked by a series of concrete vaults.

Observations, continued:

b) Sta. 168+50 - 169+50: Riprap slope is relatively steep and may not be adequately protected from concentrated flows around the bridge abutment. (Erosion/stability issue)

c) Sta. 143+00 to 150+00: Nursery operations encroach on the outboard slope. See discussion of grading impacts and irrigation line under observations section.

d) Grass/weeds are tall and thick in some areas. Outfall at Sta. 155+20 is blocked/inoperable. Maybe it is no longer needed/used?

e) Outfall at Sta. 155+20 is blocked.

f) Minor gopher burrows noted. Few appear to be active. Many have been filled with grout.

g) Minor longitudinal cracking in trail pavement at crest, 157+50 - 168+50

Left (west) Bank | Station Interval From: 143+00 To: 169+50 | Other Reach/Location ID

PHOTOS

Photo ID	Location	Description
127-129	143+00	N views of inboard/outboard slopes
130	145+00	Electrical Tower @ 145+00
131, 132	145+10	Grading for tow boxes on outboard slope
133, 134	146+20	Irrigation lines in outboard slope
135	147+50	Grading @ outboard slope
136-139	148+00	N/S views of inboard/outboard slopes
140, 141	148+00	N/S views of inboard slope from lower access road
142	148+00	S. view of low-flow channel.
143	150+00	Irrigation lines on outboard slope
144	151+00	Electrical Tower @ 151+00
145-148	155+00	N/S views of inboard/outboard slopes
149-151	155+20	84" SD outfall w/48" flap gate
152-155	155+20	N/S views of inboard slope and low-flow channel
156	155+20	84" outfall
157, 158	155+20	48" cmp inlet
159, 160	155+20	N/S views of outboard slope
161	159+10	Electrical Tower on outboard slope
162	159+50	24" SD outfall
163	159+50	Outboard slope opposite 24" outfall
164-169	159+50	24" outfall and apron
170	159+50	Eroded splash basin at bottom of apron

SURVEY POINTS

Point ID	Location	Description
24	155+20	84" cmp outfall w/ 48" flap gate (top of cmp)
25	159+50	24" steel pipe outfall w/ grate (no flap gate)
26	169+50	Crittenden Lane Bridge, Left Abutment (top of rail)
27	169+50	Crittenden Lane Bridge, Right Abutment (top of rail)
28	155+20	SD culvert inlet (48" cmp)
PHOTOS, continued		
171	159+50	N. view of inboard slope
172-175	162+50	N/S views of inboard/outboard slopes
176	168+00	Electrical Tower on outboard slope
177	167+50	S. view of outboard slope
178	167+50	Leveed borrow
179, 180	169+00	S view of inboard/outboard slopes
181	168+50	Crittenden Bridge and riprap slope
182	169+00	Riprap slope from opposite bank

ATTACHMENT 2

FIELD RECONNAISSANCE PHOTOS

STEVENS CREEK EAST LEVEE



Photograph ID	Approximate Location (Project Station)	Description
E001	110+40	Inboard levee slope and channel, northwest view



Photograph ID	Approximate Location (Project Station)	Description
E002	110+40	Levee crest and channel, north view



Photograph ID	Approximate Location (Project Station)	Description
E003	110+40	Concrete channel, north view



Photograph ID	Approximate Location (Project Station)	Description
E004	112+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E005	112+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E006	112+00	Concrete channel and drop structure



Photograph ID	Approximate Location (Project Station)	Description
E007	112+00	Concrete channel and drop structure



Photograph ID	Approximate Location (Project Station)	Description
E008	112+00	Concrete channel and drop structure



Photograph ID	Approximate Location (Project Station)	Description
E009	111+50	Concrete and rock dissipator baffles (panorama with E009 – E011)



Photograph ID	Approximate Location (Project Station)	Description
E010	111+50	Concrete sack slope and dissipator baffles (panorama with E009 – E011)



Photograph ID	Approximate Location (Project Station)	Description
E011	111+50	Concrete sack slope and channel wall (panorama with E009 – E011)



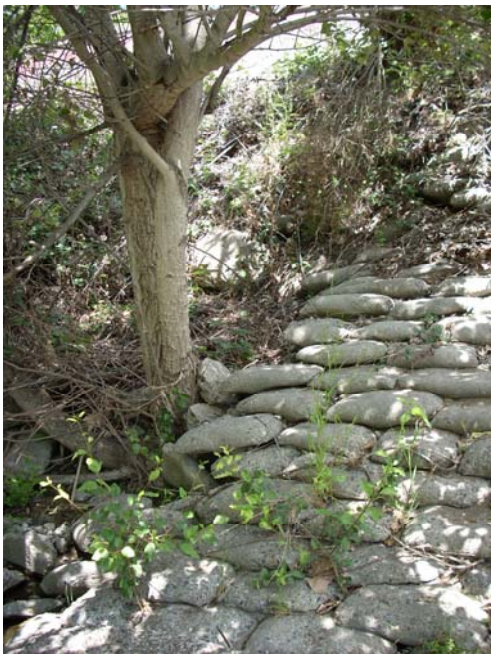
Photograph ID	Approximate Location (Project Station)	Description
E012	112+30	Scour between edge of baffles and concrete sack slope



Photograph ID	Approximate Location (Project Station)	Description
E013	112+30	Scour between edge of baffles and concrete sack slope



Photograph ID	Approximate Location (Project Station)	Description
E014	112+50	Scour at downstream end of concrete sack slope



Photograph ID	Approximate Location (Project Station)	Description
E015	112+50	Scour at downstream end of concrete sack slope



Photograph ID	Approximate Location (Project Station)	Description
E016	112+50	Scour at downstream end of concrete sack slope



Photograph ID	Approximate Location (Project Station)	Description
E017	113+00	Heavy growth and debris in channel (panorama with E017 – E021)



Photograph ID	Approximate Location (Project Station)	Description
E018	113+00	Heavy growth and debris in channel (panorama with E017 – E021)



Photograph ID	Approximate Location (Project Station)	Description
E019	113+00	Heavy growth and debris in channel (panorama with E017 – E021)



Photograph ID	Approximate Location (Project Station)	Description
E020	113+00	Heavy growth and debris in channel (panorama with E017 – E021)



Photograph ID	Approximate Location (Project Station)	Description
E021	113+00	Heavy growth and debris in channel (panorama with E017 – E021)



Photograph ID	Approximate Location (Project Station)	Description
E022	113+00	Channel looking upstream (South view)



Photograph ID	Approximate Location (Project Station)	Description
E023	113+40	Crack in levee crest



Photograph ID	Approximate Location (Project Station)	Description
E024	113+40	Crack in levee crest



Photograph ID	Approximate Location (Project Station)	Description
E025	113+50	Crack in levee crest – probe buried approximately 34”



Photograph ID	Approximate Location (Project Station)	Description
E026	113+80	Crack in levee crest – probe buried approximately 36”



Photograph ID	Approximate Location (Project Station)	Description
E027	113+80	Crack in levee crest – probe buried approximately 36”



Photograph ID	Approximate Location (Project Station)	Description
E028	114+20	Downstream end of crack, south view



Photograph ID	Approximate Location (Project Station)	Description
E029	114+50	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E030	114+50	South view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E031	114+50	Heavy vegetation in channel



Photograph ID	Approximate Location (Project Station)	Description
E032	115+50	Hole, perhaps sunken boring, in levee crest, approximately 18” deep



Photograph ID	Approximate Location (Project Station)	Description
E033	110+40	Buried pipe (casing?) next to Highway 101 bridge



Photograph ID	Approximate Location (Project Station)	Description
E034	110+40	Buried pipe (casing?) next to Highway 101 bridge



Photograph ID	Approximate Location (Project Station)	Description
E035	116+00	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E036	116+00	South view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E037	116+00	Heavy vegetation and debris in channel (panorama with E037 – E039)



Photograph ID	Approximate Location (Project Station)	Description
E038	116+00	Heavy vegetation and debris in channel (panorama with E037 – E039)



Photograph ID	Approximate Location (Project Station)	Description
E039	116+00	Heavy vegetation and debris in channel (panorama with E037 – E039)



Photograph ID	Approximate Location (Project Station)	Description
E040	113+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E041	114+50	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E042	114+50	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E043	116+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E044	116+30	Storm drain outfall with concrete headwall



Photograph ID	Approximate Location (Project Station)	Description
E045	116+30	Storm drain outfall with concrete headwall



Photograph ID	Approximate Location (Project Station)	Description
E046	116+40	Storm drain outfall clogged with debris



Photograph ID	Approximate Location (Project Station)	Description
E047	116+40	Storm drain outfall – clogged with debris



Photograph ID	Approximate Location (Project Station)	Description
E048	117+50	North view of steep stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E049	117+50	South view of steep stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E050	118+00	North view of steep stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E051	118+00	Tress and vegetation in channel



Photograph ID	Approximate Location (Project Station)	Description
E052	116+50	Deep (>36”) hole on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E053	116+50	Deep (>36”) hole on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E054	116+50	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E055	118+50	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E056	118+50	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E057	117+50	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E058	117+50	South view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E059	119+00	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E060	119+00	South view of inboard levee/ stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E061	119+00	Scour at upstream end of concrete sack surfacing



Photograph ID	Approximate Location (Project Station)	Description
E062	119+00	Scour at upstream end of concrete sack surfacing



Photograph ID	Approximate Location (Project Station)	Description
E063	119+00	Scour at upstream end of concrete sack surfacing



Photograph ID	Approximate Location (Project Station)	Description
E064	119+50	Concrete apron and drop structure (panorama with E064 – E068)



Photograph ID	Approximate Location (Project Station)	Description
E065	119+50	Concrete apron and drop structure (panorama with E064 – E068)



Photograph ID	Approximate Location (Project Station)	Description
E066	119+50	Concrete apron and drop structure (panorama with E064 – E068)



Photograph ID	Approximate Location (Project Station)	Description
E067	119+50	Concrete apron and drop structure (panorama with E064 – E068)



Photograph ID	Approximate Location (Project Station)	Description
E068	119+50	Concrete apron and drop structure (panorama with E064 – E068)



Photograph ID	Approximate Location (Project Station)	Description
E069	119+00	Scour at upstream end of concrete sack surface (from opposite bank)



Photograph ID	Approximate Location (Project Station)	Description
E070	119+00	Scour at upstream end of concrete sack surface (from opposite bank)



Photograph ID	Approximate Location (Project Station)	Description
E071	119+50	Concrete and rock baffles in downstream channel (north view)



Photograph ID	Approximate Location (Project Station)	Description
E072	119+50	Concrete drop structure in upstream channel (south view)



Photograph ID	Approximate Location (Project Station)	Description
E073	120+00	North view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E074	120+00	North view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E075	120+00	South view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E076	120+00	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E077	120+50	North view of steep stream bank slope (approximately 10-15 feet high)



Photograph ID	Approximate Location (Project Station)	Description
E078	121+00	North view of erosion and caving of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E079	121+00	South view of erosion and caving of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E080	121+50	North view of steep stream bank slope (panorama with E081)



Photograph ID	Approximate Location (Project Station)	Description
E081	121+50	North view of steep stream bank slope (panorama with E080)



Photograph ID	Approximate Location (Project Station)	Description
E082	121+50	South view of steep stream bank slope (panorama with E083)



Photograph ID	Approximate Location (Project Station)	Description
E083	121+50	South view of steep stream bank slope (panorama with E082)



Photograph ID	Approximate Location (Project Station)	Description
E084	121+50	North view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E085	121+50	North view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E086	121+20	North view of steep stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E087	121+20	South view of steep stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E088	122+30	North view of steep stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E089	122+50	Fallen tree across channel



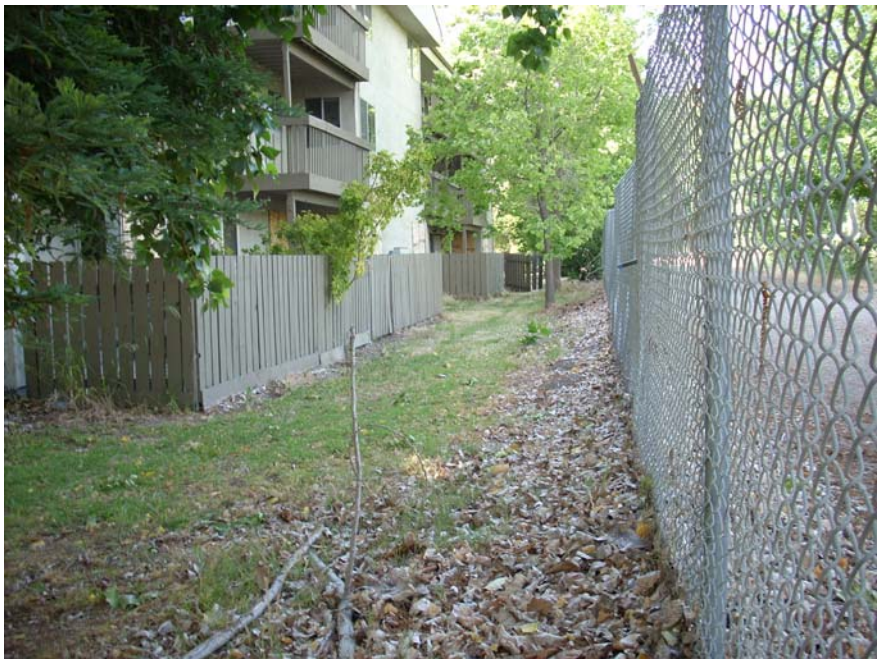
Photograph ID	Approximate Location (Project Station)	Description
E090	122+50	Fallen tree across channel (root ball)



Photograph ID	Approximate Location (Project Station)	Description
E091	122+50	Fallen tree across channel (root ball)



Photograph ID	Approximate Location (Project Station)	Description
E092	123+00	North view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E093	123+00	South view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E094	123+00	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E095	124+00	Downstream (north) view of creek channel (panorama with E096)



Photograph ID	Approximate Location (Project Station)	Description
E096	124+00	Downstream (north) view of creek channel (panorama with E095)



Photograph ID	Approximate Location (Project Station)	Description
E097	125+00	South (upstream) view of creek channel



Photograph ID	Approximate Location (Project Station)	Description
E098	125+00	Outfall and concrete apron



Photograph ID	Approximate Location (Project Station)	Description
E099	125+30	South (upstream) view of creek channel



Photograph ID	Approximate Location (Project Station)	Description
E100	125+30	15” CMP outfall



Photograph ID	Approximate Location (Project Station)	Description
E101	124+90	Gopher burrow on outboard side of access road



Photograph ID	Approximate Location (Project Station)	Description
E102	126+00	North view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E103	126+00	North view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E104	126+00	South view of outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E105	126+00	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E106	125+30	Storm sewer manhole



Photograph ID	Approximate Location (Project Station)	Description
E107	141+00	Outboard side of floodwall, north view



Photograph ID	Approximate Location (Project Station)	Description
E108	131+00	Outboard side of floodwall, north view



Photograph ID	Approximate Location (Project Station)	Description
E109	131+00	Outboard side of floodwall, south view



Photograph ID	Approximate Location (Project Station)	Description
E110	127+00	Outboard side of floodwall, north view



Photograph ID	Approximate Location (Project Station)	Description
E111	127+00	Outboard side of floodwall, south view



Photograph ID	Approximate Location (Project Station)	Description
E112	128+80	Storm drain manhole and grate



Photograph ID	Approximate Location (Project Station)	Description
E113	128+80	Outboard side of flood wall, northwest view



Photograph ID	Approximate Location (Project Station)	Description
E114	128+80	Outboard side of flood wall, southwest view



Photograph ID	Approximate Location (Project Station)	Description
E115	129+80	Monitoring well



Photograph ID	Approximate Location (Project Station)	Description
E116	133+00	Outboard side of flood wall, north view



Photograph ID	Approximate Location (Project Station)	Description
E117	133+00	Outboard side of flood wall, south view



Photograph ID	Approximate Location (Project Station)	Description
E118	137+00	Outboard side of flood wall, north view



Photograph ID	Approximate Location (Project Station)	Description
E119	137+00	Outboard side of flood wall, south view



Photograph ID	Approximate Location (Project Station)	Description
E120	139+00	Outboard side of flood wall, typical crack



Photograph ID	Approximate Location (Project Station)	Description
E121	139+00	Outboard side of flood wall, typical crack (close-up)



Photograph ID	Approximate Location (Project Station)	Description
E122	141+00	Outboard side of flood wall, north view



Photograph ID	Approximate Location (Project Station)	Description
E123	141+00	Outboard side of flood wall, south view



Photograph ID	Approximate Location (Project Station)	Description
E124	136+50	Overgrown, unmarked manhole at base of wall (outboard side)



Photograph ID	Approximate Location (Project Station)	Description
E125	136+50	Overgrown, unmarked manhole at base of wall (outboard side)



Photograph ID	Approximate Location (Project Station)	Description
E126	136+50	24” CMP storm drain outfall and concrete apron



Photograph ID	Approximate Location (Project Station)	Description
E127	136+50	Concrete apron (at edge of low-flow channel)



Photograph ID	Approximate Location (Project Station)	Description
E128	136+50	Concrete apron (at edge of low-flow channel)



Photograph ID	Approximate Location (Project Station)	Description
E129	128+80	20” CMP storm drain outfall and concrete apron



Photograph ID	Approximate Location (Project Station)	Description
E130	128+80	20” CMP storm drain outfall



Photograph ID	Approximate Location (Project Station)	Description
E131	128+80	Concrete apron (at edge of low-flow channel)



Photograph ID	Approximate Location (Project Station)	Description
E132	128+80	Downstream (north) view of creek channel



Photograph ID	Approximate Location (Project Station)	Description
E133	128+80	Upstream (south) view of creek channel



Photograph ID	Approximate Location (Project Station)	Description
E134	126+80	Upstream (south) end of flood wall



Photograph ID	Approximate Location (Project Station)	Description
E135	130+00	North view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E136	130+00	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E137	130+50	Top of flood wall (north view)



Photograph ID	Approximate Location (Project Station)	Description
E138	130+50	Top of flood wall (south view)



Photograph ID	Approximate Location (Project Station)	Description
E139	132+00	Top of flood wall (north view)



Photograph ID	Approximate Location (Project Station)	Description
E140	132+00	Top of flood wall (south view)



Photograph ID	Approximate Location (Project Station)	Description
E141	132+00 – 132+50	Ground cracks along crest of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E142	132+00 – 132+50	Ground cracks along crest of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E143	132+00 – 132+50	Ground cracks along crest of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
E144	134+00	North view of creek bank slope



Photograph ID	Approximate Location (Project Station)	Description
E145	134+00	South view of creek bank slope



Photograph ID	Approximate Location (Project Station)	Description
E146	135+00	Inboard side of flood wall, north view



Photograph ID	Approximate Location (Project Station)	Description
E147	135+00	Inboard side of flood wall, south view



Photograph ID	Approximate Location (Project Station)	Description
E148	140+00	Downstream (north) view of stream bank and channel



Photograph ID	Approximate Location (Project Station)	Description
E149	140+00	Upstream (south) view of stream bank and channel



Photograph ID	Approximate Location (Project Station)	Description
E150	140+00	Possible old gopher burrow at base of flood wall, inboard side



Photograph ID	Approximate Location (Project Station)	Description
E151	142+50	Downstream (south) end of flood wall, south view



Photograph ID	Approximate Location (Project Station)	Description
E152	142+50	Downstream (south) end of flood wall, north view



Photograph ID	Approximate Location (Project Station)	Description
E153	142+50	Downstream (south) end of flood wall, north view



Photograph ID	Approximate Location (Project Station)	Description
E154	132+70	Gopher burrow at base of flood wall, inboard side



Photograph ID	Approximate Location (Project Station)	Description
E155	169+20	12” CMP outfall and concrete apron



Photograph ID	Approximate Location (Project Station)	Description
E156	169+20	12” CMP outfall and concrete apron



Photograph ID	Approximate Location (Project Station)	Description
E157	169+20	12” CMP outfall and concrete apron



Photograph ID	Approximate Location (Project Station)	Description
E158	169+20	12” CMP outfall, close-up of flap gate



Photograph ID	Approximate Location (Project Station)	Description
E159	143+00	North view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
E160	143+00	South view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
E161	143+00	North view of high-flow channel, access road, and inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E162	143+00	South view of high-flow channel, access road, and inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E163	144+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E164	144+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E165	146+70	Ground squirrel burrow on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E166	147+80	Ground squirrel burrows on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E167	148+90	Ground squirrel burrows on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E168	150+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E169	150+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E170	150+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E171	150+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E172	150+00	Debris in low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
E173	150+00	Debris in low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
E174	150+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E175	150+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E176	151+50	Area of severe burrowing, outboard slope



Photograph ID	Approximate Location (Project Station)	Description
E177	159+20	Vault with manhole on outboard side of levee opposite outfall, not accessible



Photograph ID	Approximate Location (Project Station)	Description
E178	159+20	Vault with manhole on outboard side of levee opposite outfall (close-up)



Photograph ID	Approximate Location (Project Station)	Description
E179	159+20	12” CMP outfall, from top of levee



Photograph ID	Approximate Location (Project Station)	Description
E180	159+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E181	159+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E182	159+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E183	159+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E184	159+00	North view of high-flow channel and inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E185	159+00	South view of high-flow channel and inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
E186	159+00	North view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
E187	159+00	South view of low flow channel



Photograph ID	Approximate Location (Project Station)	Description
E188	169+50	Upstream (south) view from east end of Crittenden Lane Bridge



Photograph ID	Approximate Location (Project Station)	Description
E189	169+50	Upstream (south) view from east end of Crittenden Lane Bridge



Photograph ID	Approximate Location (Project Station)	Description
E190	169+50	Upstream (south) view from east end of Crittenden Lane Bridge



Photograph ID	Approximate Location (Project Station)	Description
E191	169+50	Upstream (south) view from east end of Crittenden Lane Bridge



Photograph ID	Approximate Location (Project Station)	Description
E192	168+50	Crittenden Lane bridge, abutment, and riprap slope (panorama with E192 – E194)



Photograph ID	Approximate Location (Project Station)	Description
E193	168+50	Crittenden Lane bridge, abutment, and riprap slope (panorama with E192 – E194)



Photograph ID	Approximate Location (Project Station)	Description
E194	168+50	Crittenden Lane bridge, abutment, and riprap slope (panorama with E192 – E194)



Photograph ID	Approximate Location (Project Station)	Description
E195	169+00	Riprap slope (from opposite bank)

STEVENS CREEK WEST LEVEE



Photograph ID	Approximate Location (Project Station)	Description
W001	111+00	East view across levee toward creek channel, Highway 101 on right



Photograph ID	Approximate Location (Project Station)	Description
W002	111+00	North view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W003	111+00	North view of bicycle trail and creek channel



Photograph ID	Approximate Location (Project Station)	Description
W004	112+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W005	112+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W006	112+00	North view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W007	112+00	South view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W008	113+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W009	113+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W010	113+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W011	113+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W012	112+00	Retaining wall on inboard levee slope, south view



Photograph ID	Approximate Location (Project Station)	Description
W013	111+00	North view of concrete channel



Photograph ID	Approximate Location (Project Station)	Description
W014	112+00	South view of concrete channel



Photograph ID	Approximate Location (Project Station)	Description
W015	111+50	North view of concrete sack slope



Photograph ID	Approximate Location (Project Station)	Description
W016	113+00	South view of riprap on stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W017	113+00	North view of vegetated stream bank slope and channel



Photograph ID	Approximate Location (Project Station)	Description
W018	113+50	South view of inboard levee and stream bank slopes



Photograph ID	Approximate Location (Project Station)	Description
W019	114+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W020	114+00	North view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W021	114+00	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W022	115+00	Irrigation boxes on outboard levee slope, note longitudinal cracking in pavement



Photograph ID	Approximate Location (Project Station)	Description
W023	117+20	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W024	117+20	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W025	117+20	North view of drainage swale on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W026	117+20	South view of drainage swale on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W027	118+00	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W028	118+00	South view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W029	117+00	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W030	116+00	North view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W031	116+00	South view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W032	115+00	North view of stream bank slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W033	115+00	North view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W034	118+20	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W035	119+20	South view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W036	119+50	Drop structure and apron, view from opposite bank (panorama with W036 – W040)



Photograph ID	Approximate Location (Project Station)	Description
W037	119+50	Drop structure and apron, view from opposite bank (panorama with W036 – W040)



Photograph ID	Approximate Location (Project Station)	Description
W038	119+50	Apron, baffles, and slope protection, view from opposite bank (panorama with W036 – W040)



Photograph ID	Approximate Location (Project Station)	Description
W039	119+50	Apron, baffles, and slope protection, view from opposite bank (panorama with W036 – W040)



Photograph ID	Approximate Location (Project Station)	Description
W040	119+50	Baffles and slope protection, view from opposite bank (panorama with W036 – W040)



Photograph ID	Approximate Location (Project Station)	Description
W041	119+50	Apron and overgrown riprap on stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W042	119+50	Overgrown riprap on stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W043	120+00	North view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W044	120+00	South view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W045	126+50	Storm drain outfall (78” CMP with 48” flap gate)



Photograph ID	Approximate Location (Project Station)	Description
W046	126+50	Storm drain outfall (78” CMP with 48” flap gate)



Photograph ID	Approximate Location (Project Station)	Description
W047	126+50	Storm drain outfall (78” CMP with 48” flap gate)



Photograph ID	Approximate Location (Project Station)	Description
W048	120+00	North view of “swale” area, parking lot, and landscaping on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W049	120+00	North view of “swale” area, parking lot, and landscaping on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W050	120+00	South view of “swale” area and landscaping on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W051	120+50	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W052	120+50	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W053	120+50	South view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W054	120+50	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W055	122+00	North view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W056	122+00	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W057	123+00	North view of high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W058	123+00	North view of low-flow channel obstructed by fallen tree



Photograph ID	Approximate Location (Project Station)	Description
W059	123+00	South view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W060	123+00	South view of high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W061	125+50	South view of stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W062	124+80	Outboard levee slope and swale area, southwest view



Photograph ID	Approximate Location (Project Station)	Description
W063	125+20	North view of amphitheater area (panorama with W064)



Photograph ID	Approximate Location (Project Station)	Description
W064	125+20	North view of amphitheater area (panorama with W063)



Photograph ID	Approximate Location (Project Station)	Description
W065	126+70	Amphitheater area, northeast view from La Avenida Ave. (panorama with W065 – W067)



Photograph ID	Approximate Location (Project Station)	Description
W066	126+70	Amphitheater area, east view from La Avenida Ave. (panorama with W065 – W067)



Photograph ID	Approximate Location (Project Station)	Description
W067	126+70	Amphitheater area, southeast view from La Avenida Ave. (panorama with W065 – W067)



Photograph ID	Approximate Location (Project Station)	Description
W068	126+00	North view of concrete sack slope and wall located east of amphitheater area



Photograph ID	Approximate Location (Project Station)	Description
W069	127+00	South view of amphitheater area



Photograph ID	Approximate Location (Project Station)	Description
W070	126+80	Concrete sack slope and wall located east of amphitheater area



Photograph ID	Approximate Location (Project Station)	Description
W071	126+80	Concrete sack slope and wall located east of amphitheater area, south view



Photograph ID	Approximate Location (Project Station)	Description
W072	126+60	Outboard side of concrete sack wall



Photograph ID	Approximate Location (Project Station)	Description
W073	125+50	Riprap and concrete sack slope, from opposite bank (panorama with W074)



Photograph ID	Approximate Location (Project Station)	Description
W074	125+50	Riprap and concrete sack slope, from opposite bank (panorama with W073)



Photograph ID	Approximate Location (Project Station)	Description
W075	126+50	Concrete sack slope and outfall, from opposite bank (panorama with W075 – W077)



Photograph ID	Approximate Location (Project Station)	Description
W076	126+50	Concrete sack slope and outfall, from opposite bank (panorama with W075 – W077)



Photograph ID	Approximate Location (Project Station)	Description
W077	126+50	Concrete sack slope and outfall, from opposite bank (panorama with W075 – W077)



Photograph ID	Approximate Location (Project Station)	Description
W078	121+20	Longitudinal cracks in pavement, north view



Photograph ID	Approximate Location (Project Station)	Description
W079	121+20	Longitudinal cracks in pavement, close-up



Photograph ID	Approximate Location (Project Station)	Description
W080	127+00	North view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W081	127+00	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W082	128+50	Filled cracks in pavement, north view



Photograph ID	Approximate Location (Project Station)	Description
W083	129+90	Outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W084	130+30	South view of inboard levee/stream bank slop



Photograph ID	Approximate Location (Project Station)	Description
W085	130+30	South view of levee crest



Photograph ID	Approximate Location (Project Station)	Description
W086	126+50	Outboard side of levee (behind thick hedge)



Photograph ID	Approximate Location (Project Station)	Description
W087	127+50	Outboard side of levee (behind thick hedge)



Photograph ID	Approximate Location (Project Station)	Description
W088	130+30	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W089	130+30	North view of inboard levee/stream bank slope



Photograph ID	Approximate Location (Project Station)	Description
W090	130+30	Filled pavement cracks, north view



Photograph ID	Approximate Location (Project Station)	Description
W091	130+30	North view of inboard levee/stream bank slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W092	130+30	South view of inboard levee/stream bank slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W093	130+30	North view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W094	133+00	Fallen tree and debris in low-flow channel, north view



Photograph ID	Approximate Location (Project Station)	Description
W095	136+20	Fallen tree and debris in low-flow channel, view from levee crest



Photograph ID	Approximate Location (Project Station)	Description
W096	136+40	42” CMP outfall with 24” flap gate, partially blocked by fallen tree



Photograph ID	Approximate Location (Project Station)	Description
W097	136+40	42” CMP outfall with 24” flap gate, partially blocked by fallen tree



Photograph ID	Approximate Location (Project Station)	Description
W098	136+40	42” CMP outfall with 24” flap gate, partially blocked by fallen tree



Photograph ID	Approximate Location (Project Station)	Description
W099	136+40	6” CMP outfall, on slope above 42” CMP outfall



Photograph ID	Approximate Location (Project Station)	Description
W100	136+40	6” CMP outfall, close-up view



Photograph ID	Approximate Location (Project Station)	Description
W101	136+40	Sump box on outboard side of levee opposite 6” CMP outfall, view from levee crest



Photograph ID	Approximate Location (Project Station)	Description
W102	136+40	Sump box on outboard side of levee opposite 6” CMP outfall, close-up view from levee crest



Photograph ID	Approximate Location (Project Station)	Description
W103	135+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W104	135+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W105	135+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W106	135+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W107	135+90	Fallen tree across low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W108	136+40	Concrete sack slope and concrete apron for 6” and 42” CMP outfalls



Photograph ID	Approximate Location (Project Station)	Description
W109	136+50	Electrical tower on outboard levee slope, south view



Photograph ID	Approximate Location (Project Station)	Description
W110	139+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W111	139+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W112	139+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W113	139+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W114	140+00	Erosion of the low-flow channel slope along the edge of the lower access road



Photograph ID	Approximate Location (Project Station)	Description
W115	141+50	North view of inboard levee slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W116	141+50	South view of inboard levee slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W117	141+90	60” CMP outfall with 36” flap gate



Photograph ID	Approximate Location (Project Station)	Description
W118	141+90	60” CMP outfall with 36” flap gate beneath double 10” CMP outfalls (without flap gates)



Photograph ID	Approximate Location (Project Station)	Description
W119	141+90	60” CMP outfall, view from inboard levee slope above outfall



Photograph ID	Approximate Location (Project Station)	Description
W120	141+90	Double 10” CMP outfalls



Photograph ID	Approximate Location (Project Station)	Description
W121	141+90	Double 10” CMP pipes on outboard side of levee opposite outfalls



Photograph ID	Approximate Location (Project Station)	Description
W122	141+90	Double 10” CMP pipes on outboard side of levee opposite outfalls



Photograph ID	Approximate Location (Project Station)	Description
W123	141+90	Sump and discharge pipes on the outboard side of the levee opposite 10” CMP outfalls



Photograph ID	Approximate Location (Project Station)	Description
W124	142+80	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W125	142+80	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W126	143+00	Electrical tower on outboard levee slope, southwest view



Photograph ID	Approximate Location (Project Station)	Description
W127	143+00	Outboard levee slope, north view from toe



Photograph ID	Approximate Location (Project Station)	Description
W128	143+00	Outboard levee slope, north view from crest



Photograph ID	Approximate Location (Project Station)	Description
W129	143+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W130	145+00	Electrical tower on outboard levee slope, northwest view



Photograph ID	Approximate Location (Project Station)	Description
W131	145+10	Grading for tree boxes on outboard levee slope, northeast view from toe



Photograph ID	Approximate Location (Project Station)	Description
W132	145+10	Grading for tree boxes on outboard levee slope, north view from graded pad



Photograph ID	Approximate Location (Project Station)	Description
W133	146+20	Irrigation lines on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W134	146+20	Irrigation lines on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W135	147+50	Grading for tree boxes on outboard levee slope, south view from graded pad



Photograph ID	Approximate Location (Project Station)	Description
W136	148+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W137	148+00	North view of inboard levee slope



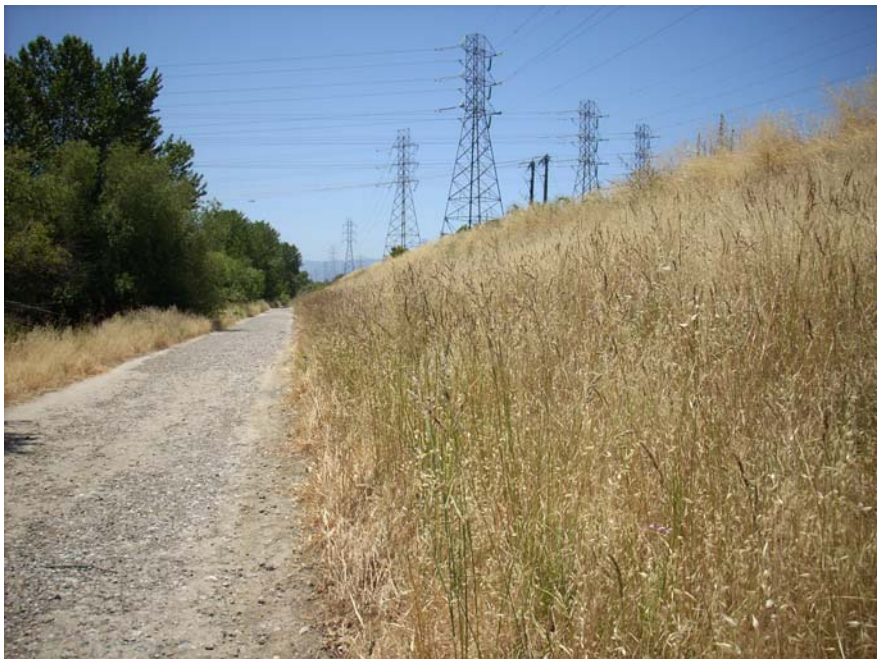
Photograph ID	Approximate Location (Project Station)	Description
W138	148+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W139	148+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W140	148+00	North view of inboard levee slope and high-flow channel, from lower access road



Photograph ID	Approximate Location (Project Station)	Description
W141	148+00	South view of inboard levee slope and high-flow channel, from lower access road



Photograph ID	Approximate Location (Project Station)	Description
W142	148+00	South view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W143	150+00	Irrigation lines on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W144	151+00	Electrical tower and pole on outboard levee slope, northwest view



Photograph ID	Approximate Location (Project Station)	Description
W145	155+00	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W146	155+00	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W147	155+00	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W148	155+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W149	155+20	84” CMP outfall with 48” flap gate (blocked)



Photograph ID	Approximate Location (Project Station)	Description
W150	155+20	84” CMP outfall with 48” flap gate (blocked)



Photograph ID	Approximate Location (Project Station)	Description
W151	155+20	84” CMP outfall with 48” flap gate (blocked)



Photograph ID	Approximate Location (Project Station)	Description
W152	155+20	North view of inboard levee slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W153	155+20	North view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W154	155+20	South view of low-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W155	155+20	South view of inboard levee slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W156	155+20	Concrete sack slope above 84” CMP outfall, view from levee crest



Photograph ID	Approximate Location (Project Station)	Description
W157	155+20	48” CMP inlet on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W158	155+20	48” CMP inlet on outboard side of levee



Photograph ID	Approximate Location (Project Station)	Description
W159	155+20	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W160	155+20	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W161	159+10	Electrical tower on outboard levee slope, northwest view



Photograph ID	Approximate Location (Project Station)	Description
W162	159+50	Concrete sack slope and apron for 24” welded steel pipe (WSP) outfall, view from levee crest



Photograph ID	Approximate Location (Project Station)	Description
W163	159+50	Outboard side of levee opposite 24” WSP outfall



Photograph ID	Approximate Location (Project Station)	Description
W164	159+50	24” WSP outfall and concrete apron, northwest view



Photograph ID	Approximate Location (Project Station)	Description
W165	159+50	Concrete apron at base of 24” WSP outfall



Photograph ID	Approximate Location (Project Station)	Description
W166	159+50	24” WSP outfall



Photograph ID	Approximate Location (Project Station)	Description
W167	159+50	24” WSP outfall, close-up view of grate



Photograph ID	Approximate Location (Project Station)	Description
W168	159+50	Concrete apron for 24” WSP outfall



Photograph ID	Approximate Location (Project Station)	Description
W169	159+50	24” WSP outfall and apron, south view



Photograph ID	Approximate Location (Project Station)	Description
W170	159+50	Eroded splash basin in low-flow channel at the base of the concrete apron



Photograph ID	Approximate Location (Project Station)	Description
W171	159+50	North view of inboard levee slope and high-flow channel



Photograph ID	Approximate Location (Project Station)	Description
W172	162+50	North view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W173	162+50	North view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W174	162+50	South view of inboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W175	162+50	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W176	168+00	Electrical tower on outboard levee slope, northwest view



Photograph ID	Approximate Location (Project Station)	Description
W177	167+50	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W178	167+50	Grouted burrow on outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W179	169+00	South view of inboard levee slope and creek channel



Photograph ID	Approximate Location (Project Station)	Description
W180	169+00	South view of outboard levee slope



Photograph ID	Approximate Location (Project Station)	Description
W181	168+50	Crittenden Lane Bridge and riprap slope, north view



Photograph ID	Approximate Location (Project Station)	Description
W182	169+00	Riprap slope, view from opposite bank

ATTACHMENT 3

GPS LOCATIONS AND FEATURE DESCRIPTIONS

TABLE 3-1

SUMMARY OF GPS SURVEY POINTS AND DESCRIPTIONS - EAST LEVEE

Stevens Creek Levee Recertification Project, Phase B2

Mountain View, California

Point ID	Description	Approximate Station	Approximate Northing (ft)	Approximate Easting (ft)	Approximate Elevation (ft)
E01	South end of observed crack in levee crest	113+35	13,584,938	1,910,797	29
E02	North end of observed crack in levee crest	114+15	13,585,014	1,910,799	34
E03	Storm drain outfall, 12-inch diameter corrugated metal pipe (CMP), survey point approximately 24 inches above invert	116+30	13,585,223	1,910,789	21
E04	Storm drain outfall, 12-inch diameter CMP, survey point approximately 24 inches above invert	116+40	13,585,242	1,910,792	31
E05	Storm drain outfall, 15-inch diameter CMP, survey point at invert	125+30	13,586,133	1,910,851	11
E06	Manhole on outboard side of levee opposite 15-inch CMP outfall	125+30	13,586,122	1,910,877	25
E07	Storm drain inlet on outboard side of flood wall (circular grate)	128+90	13,586,465	1,910,924	31
E08	Manhole on outboard side of flood wall opposite 20-inch CMP outfall	128+80	13,586,459	1,910,924	30
E09	Monitoring well MCH-9UA	129+80	13,586,553	1,910,926	19
E10	Unmarked, overgrown manhole on outboard side of flood wall opposite 24-inch CMP outfall	136+50	13,587,231	1,910,908	19
E11	Top of flood wall (GPS points collected as a linear feature)	126+80 - 142+50	varies	varies	varies
E12	Storm drain outfall, 24-inch diameter CMP, survey point approximately 30 inches above invert	136+50	13,587,229	1,910,886	15
E13	Storm drain outfall, 20-inch diameter CMP, survey point at invert	128+80	13,586,462	1,910,886	13
E14	Storm drain outfall, 12-inch diameter CMP with flap gate, survey point at top of pipe	169+20	13,589,499	1,910,855	4

Notes:

1. Northing and easting coordinates per UTM Zone 10 North, NAD 1983 datum.
2. Elevations relative to mean sea level (MSL).
3. Estimated horizontal precisions range from approximately 1 to 3 feet. See post-processing summary for details.
4. With the exception of point E13, estimated vertical precisions range from approximately 1 to 3 feet. Point E 13 has an estimated vertical precision of approximately 11 feet. See post-processing summary for details.

TABLE 3-2

SUMMARY OF GPS SURVEY POINTS AND DESCRIPTIONS - WEST LEVEE

Stevens Creek Levee Recertification Project, Phase B2

Mountain View, California

Point ID	Description	Approximate Station	Approximate Northing (ft)	Approximate Easting (ft)	Approximate Elevation (ft)
W15	Storm drain outfall, 78-inch diameter CMP with 48-inch diameter flap gate, survey point at top of CMP	126+50	13,586,259	1,910,790	18
W16	Manhole on outboard side of levee opposite 78-inch CMP outfall	126+50	13,586,271	1,910,744	24
W17	Top of concrete sack flood wall (GPS points collected as a linear feature)	125+00 - 127+00	varies	varies	varies
W18	Storm drain outfall, 42-inch diameter CMP with 24-inch diameter flap gate, survey point at top of CMP	136+40	13,587,220	1,910,777	7
W19	Storm drain outfall, 6-inch diameter CMP, survey point at invert	136+40	13,587,225	1,910,769	15
W20	Storm drain outfall, 60-inch diameter CMP with 36-inch diameter flap gate, survey point at top of CMP	141+90	13,587,777	1,910,777	18
W21	Storm drain outfall, double 10-inch diameter CMPs, survey point between pipes approximately 12 inches above inverts	141+90	13,587,769	1,910,772	10
W22	Storm drain pipe exposed on outboard side of levee, 10-inch diameter CMP, survey point at top of CMP	141+90	13,587,768	1,910,711	8
W23	Storm drain pipe exposed on outboard side of levee, 10-inch diameter CMP, survey point at top of CMP	141+90	13,587,766	1,910,709	13
W24	Storm drain outfall (gravity drain from inlet on opposite side of levee), 84-inch diameter CMP with 48-inch diameter flap gate, survey point at top of CMP	155+20	13,589,108	1,910,752	10
W25	Storm drain outfall, 24-inch diameter welded steel pipe (WSP), survey point at top of pipe	159+50	13,589,548	1,910,749	8
W26	Crittenden Lane Bridge, inboard edge of left abutment on upstream side of bridge, survey point at top of rail	169+50	13,590,526	1,910,756	23
W27	Crittenden Lane Bridge, inboard edge of right abutment on upstream side of bridge, survey point at top of rail	169+50	13,590,527	1,910,854	28
W28	Storm drain inlet on outboard side of levee, 48-inch diameter CMP, survey point at top of CMP	155+20	13,589,116	1,910,702	1

Notes:

1. Northing and easting coordinates per UTM Zone 10 North, NAD 1983 datum.
2. Elevations relative to mean sea level (MSL)
3. Estimated horizontal precisions range from approximately 1 to 3 feet, see detailed post-processing summary
4. Estimated vertical precisions range from approximately 1 to 3 feet. See post-processing summary for details

GPS Survey Points - Stevens Creek Levees

Post-Processing Summary

Receiver Type: GeoXH 2005
Data File: 13815_002_STEVENS_05

Point_ID	Max_PDOP	Max_HDOP	Corr_Type	GPS_Date	GPS_Time	GPS_Week	GPS_Second	Unfilt_Pos	Filt_Pos	Northing	Easting	GPS_Height	Vert_Prec	Horz_Prec	Std_Dev	Comment
1	4.2	2.4	Postprocessed Carrier Float	39596	01:05:31pm	1481	335145	20	20	13584937.87	1910797.187	28.577	1.7	1.3	0	begin crack
2	2.3	1.2	Postprocessed Carrier Float	39596	01:11:31pm	1481	335505	9	9	13585013.89	1910799.119	33.759	0.8	0.7	0	end crack
3	3.6	1.4	Postprocessed Carrier Float	39596	02:44:06pm	1481	341060	20	20	13585222.97	1910789.443	21.211	2.9	1.2	0	12" sd outfall 24" above invert
4	3.6	1.4	Postprocessed Carrier Float	39596	02:49:11pm	1481	341365	18	18	13585242.44	1910791.649	30.996	2.7	1.1	0	12" cmp outfall 24" above invert
5	3.4	1.2	Postprocessed Carrier Float	39597	07:41:31am	1481	402105	19	19	13586132.77	1910851.008	11.218	1.7	0.7	0	sd outfall 15" cmp
6	2.7	1.2	Postprocessed Carrier Float	39597	07:55:11am	1481	402925	19	19	13586122.02	1910877.179	24.756	1.4	0.6	0	sd manhole
7	2	1.2	Postprocessed Carrier Float	39597	09:02:46am	1481	406980	15	15	13586464.73	1910924.261	30.611	0.8	0.7	0	sd inlet/grate
8	2.3	1.4	Postprocessed Carrier Float	39597	09:04:36am	1481	407090	6	6	13586459.42	1910924.145	30.087	0.8	0.7	0	sd manhole
9	2.2	1.2	Postprocessed Carrier Float	39597	09:12:06am	1481	407540	18	18	13586553.11	1910925.971	19.447	1.1	0.9	0	monitoring well MCH-9UA
10	4.8	2.3	Postprocessed Carrier Float	39597	09:29:16am	1481	408570	1	1	13587230.86	1910908.284	18.712	3.8	2.7		unmarked manhole
12	3.8	1.8	Postprocessed Code	39597	10:34:06am	1481	412460	11	11	13587229.04	1910885.559	14.745	9.3	2.7	1.472599	sd outfall 24"cmp, 30" above inv
13	5.9	1.8	Postprocessed Code	39597	10:43:41am	1481	413035	29	29	13586462.45	1910885.99	12.819	10.6	3.1	1.056921	sd outfall 20" cmp
14	2	1	Postprocessed Carrier Float	39597	01:16:56pm	1481	422230	18	18	13589499.41	1910854.829	3.759	0.7	0.6	0	sd outfall 12" cmp 12" above inv
15	2.4	1.4	Postprocessed Code	39598	08:39:41am	1481	491995	26	26	13586259.21	1910789.601	18.019	2.1	1.9	0.98703	sd outfall 48" flap 78" abv. inv
16	2.1	1.3	Postprocessed Code	39598	08:43:56am	1481	492250	20	20	13586271.27	1910744.337	24.356	2.1	1.6	0.899433	sd manhole
18	2.7	1.6	Postprocessed Carrier Float	39598	11:06:51am	1481	500825	20	20	13587220.04	1910776.946	6.795	1.7	1.5	3.128439	sd outfall 36" cmp 40" abve. inv
19	2.7	1.6	Postprocessed Carrier Float	39598	11:12:11am	1481	501145	20	20	13587224.93	1910769.369	15.162	1.5	1.1	0.748688	sd outfall 6" cmp
20	2.6	1.7	Postprocessed Carrier Float	39598	11:20:51am	1481	501665	20	20	13587777.18	1910777.344	17.948	1.6	1.1	0	sd outfall 54" cmp 54" abve. inv
21	2.6	1.7	Postprocessed Carrier Float	39598	11:23:26am	1481	501820	20	20	13587769.26	1910771.972	9.685	1.7	1.2	0	sd outfall double 12" cmps
22	2.6	1.7	Postprocessed Carrier Float	39598	11:26:16am	1481	501990	20	20	13587767.91	1910710.524	7.659	1.5	1.2	0.43706	12" cmp
23	2.6	1.7	Postprocessed Carrier Float	39598	11:28:26am	1481	502120	20	20	13587766.03	1910709.1	12.575	1.4	1.1	0.192446	12" cmp
24	3.3	2.3	Postprocessed Carrier Float	39598	11:39:36am	1481	502790	20	20	13589107.66	1910752.275	9.907	1.4	1	0	sd outfall 78" cmp 78" abve. inv
25	2.8	2.1	Postprocessed Carrier Float	39598	11:47:01am	1481	503235	20	20	13589548.24	1910748.797	8.136	1.1	0.7	0	sd outfall 24" wsp 24" abve. inv
26	2	1.2	Postprocessed Carrier Float	39598	11:56:16am	1481	503790	20	20	13590525.99	1910755.957	22.748	0.9	0.4	0	bridge rt abtmt top of rail
27	3.7	2	Postprocessed Carrier Float	39598	12:08:01pm	1481	504495	21	21	13590526.79	1910854.301	27.85	2	1	0	bridge lt abtmt top of rail
28	3.7	2	Postprocessed Carrier Float	39598	12:19:11pm	1481	505165	21	21	13589115.6	1910702.247	0.885	2	1	0	sd culv inlet 48"cmp top of pipe

Coordinate System:	UTM
Coordinate Zone:	10 North
Datum:	NAD 1983 (Conus)
Coordinate Units:	US Survey Feet
Altitude Units:	US Survey Feet
Altitude Reference:	MSL
Geoid Model:	EGM96 (Global)
Distance Units:	US Survey Feet
Area Units:	Square Feet
Velocity Units:	Feet Per Second
Precision Units:	US Survey Feet

APPENDIX C

Field Exploration

Attachment C.1 – Logs of Borings

Attachment C.2 – Cone Penetration Test Logs

ATTACHMENT C.1

Logs of Borings

DATE: 9/15/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-1
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 8" hollow stem auger		HOLE ELEVATION: -----
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample	GROUND WATER DEPTH:	Initial: Not measured; Final: 19 ft (10 min. after drilling)

DESCRIPTION OF EARTH MATERIALS Approx. Sta. 117+50, east bank crest	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
FILL: CLAYEY SAND with GRAVEL to CLAYEY GRAVEL with SAND: Mostly dark brown (7.5YR 3/4), moist, dense to very dense; fine to coarse angular sand and fine angular gravel, minor coarse gravel to cobbles	SC to GC	1	S									
		2	D D	61								
		3	S									
		4	D D	92/ 11"								
ALLUVIUM: CLAYEY SAND: Dark grayish brown (10YR 4/2), dry to moist, medium dense; mostly fine to medium subrounded to rounded sand	SC	5										
		6	S D D	21		27		5				
		7										
FAT CLAY: Black (10YR 2.1/1), moist, very stiff to hard	CH	8										
		9	S D D	35	4.5+		73	24	48	97		
		10										
		11										
		12										
		13										
		14	S D D	22	3 3.5			25		97		
LEAN CLAY: Gray (2.5Y 4/1), moist, stiff	CL	15										
		16										
		17										
LEAN CLAY with SAND: Dark gray to dark grayish brown (10YR 4/1 to 4/2), moist, firm to stiff, wtih fine sand	CL	18										
		19	S D D	12	1.3 1.1							
		20	T T	Shelby tube (250 psi, 18")		72	36	23 30	17	93		

DATE: 9/15/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-1
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 8" hollow stem auger		HOLE ELEVATION: -----

SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample

GROUND WATER DEPTH: **Initial:** Not measured **Final:** 19 ft (10 min. after drilling)

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Approx. Sta. 117+50, east bank crest												
LEAN CLAY with SAND: (continued), grades slightly coarser with depth	CL	21	T	Shelby tube				26		98		TXCU (see Fig. C-14)
		22										
		23										
		24	S D	22	1.8			20		111		
* see Figure C-4 for sieve analysis results		24	D S		1.75							
CLAYEY SAND: Greenish gray (Gley 1 3/1), moist, medium dense; fine to coarse sand	SC	25	I I	23		32*		16				
		26										
		27										
LEAN CLAY: Dark greenish gray (gley 1 3/GY), moist to wet,firm to very stiff; intervals of **LEAN CLAY with SAND** to **SANDY LEAN CLAY**	CL	28										
		29	S D D	14	0.8 1.3		39	25	21	101	15	TXUU 2886
		30										
		31										
		32										
		33										
		34	S D D	23	1 2.7			22		104		
BOTTOM OF HOLE = 34.5 Feet Groundwater at 19 feet (10 minutes after completion of drilling)		35										
		36										
		37										
		38										
		39										
		40										

PACIFIC GEOTECHNICAL ENGINEERING **PAGE:** 2 of 2

DATE: 9/15/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-2
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 4" cutting head with rods, mud rotary		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample	GROUND WATER DEPTH: Initial: mud rotary; Final: ---	

DESCRIPTION OF EARTH MATERIALS Approx. Sta. 140+00, east bank crest	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
FILL: SANDY LEAN CLAY to SANDY FAT CLAY: Very dark gray (10YR 3/1), moist, hard; with fine to coarse subangular sand; mostly fine subangular to angular gravel	CL/ CH	1	S									
		2	D D	66								
ALLUVIUM: FAT CLAY: Very dark gray (2.5Y 3/1), moist, stiff to very stiff	CH	3	S									
		4	D D	28	1.7- 3.2							
dark gray (2.5YR 4/1)		5										
		6	S D D	26	3 2		62	27	42	96		
		7										
FAT CLAY with SAND: Grayish brown (2.5Y 5/2) slightly mottled with dark yellowish brown (10YR 4/4), moist to wet, stiff; with fine sand; minor medium sand; trace of organic specks	CH	8										
		9	S D D	11	1.7 1.7	92		32		90	15	TXUU 2402
		10										
		11										
LEAN CLAY: Grayish brown (2.5Y 4/2) mottled with brown (7.5YR 4/4), moist to wet, stiff	CL	12										
		13										
		14	S D D	14	2.5 1.25			29		95		
		15										
		16										
LEAN CLAY: Very dark greenish gray (GLEY 1 3/5G), wet, firm	CL	17										
		18										
		19	S D D	14	0.65 0.65	29*		37 16		85	15	TXUU 1127
CLAYEY SAND (see next page)	SC	20										
* see Figure C-5 for sieve analysis results												

DATE: 9/15/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-2
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 4" cutting head with rods, mud rotary		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample	GROUND WATER DEPTH:	Initial: mud rotary; Final: ---

DESCRIPTION OF EARTH MATERIALS (Approx. Sta. 140+00, east bank crest)	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
CLAYEY SAND: Dark grayish brown (10YR 4/2), moist to wet, loose to medium dense; fine to medium rounded sand	SC	21										
		22										
SANDY LEAN CLAY: Grayish brown (2.5Y 5/2), wet, firm to stiff; fine to coarse sand	CL	22	T	(250 psi, 6") Shelby tube		55*		33				
		23	S									
LEAN CLAY with SAND: Light olive brown (2.5YR 5/3) mottled with strong brown (10YR 4/6), moist, very stiff; trace fine sand; grades slightly coarser with depth (maybe to LEAN CLAY with SAND); minor fine sand; color is mottled with depth	CL	24	D	14	2.5							
		25	T	Shelby tube (220 psi, 18")				27		96		
		26	T									
		27	T	Shelby tube		74	31	29	9	98		TXCU
			T	(260 psi, 12")				32				(see Fig. C-15)
* see Figure C-6 for sieve analysis results ** see Figure C-7 for sieve analysis results *** see Figure C-8 for sieve analysis results		28	S									
			D	13	1.8							
		29	D									
CLAYEY SAND: Grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/4), moist to wet, medum dense, fine to coarse sand	SC	30	S	10		30**			20			
		31	I									
CLAYEY SAND: Light olive brown (2.5Y 5/3), moist to wet, loose to medium dense; fine to coarse subrounded to rounded sand	SC	32										
		33										
SANDY LEAN CLAY: Light olive brown (2.5Y 5/4), moist, firm, with fine to coarse sand	CL	34	S	4		59***	27	21	7			
		35	I									
LEAN CLAY to LEAN CLAY with SAND: Dark gray (2.5Y 4/1) to dark grayish brown (2.5Y 4/2), moist to wet, very stiff; with fine to coarse sand	CL	36										
		37										
		38	S									
thin clayey sand lens		39	D	30	2.5			16		119		
			D		2							
		40										

PACIFIC GEOTECHNICAL ENGINEERING	PAGE: 2 of 4

DATE: 9/15/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-2
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 4" cutting head with rods, mud rotary		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample	GROUND WATER DEPTH:	Initial: mud rotary; Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Approx. Sta. 140+00, east bank crest												
LEAN CLAY with SAND (continued)	CL	41										
		42										
		43										
brown (10YR 4/3), moist to wet; stiff		44	S D D	18	1.25 1							
		45	T	Shelby tube (350 psi, 9")								TXUU
		46	T			81	46	26	24	98	13	3087
grades coarser with depth		47										
SANDY LEAN CLAY: Light yellowish brown (2.5Y 6/3) with minor spots of gray (2.5Y 6/1), moist to wet, stiff; fine sand	CL	48	S D D	16		57		25		103		
		49										
		50										
		51										
FAT CLAY: Dark grayish brown (2.5Y 4/2), moist, very stiff	CH	52										
sand content is variable		53	S D D	46	poor recovery 3.75			22		108		
		54										
		55										
		56										
		57										
dark yellowish brown (10YR 4/4) mottled with gray (10YR 5/1)		58	S D D	46	poor recovery 4.1			22		108		
		59										
		60										

PACIFIC GEOTECHNICAL ENGINEERING	PAGE: 3 of 4

DATE: 9/15/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-2
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: SCVWD Stevens Creek Levees FEMA Recertification		LOGGED BY: CSS
HOLE DIAMETER: 4" cutting head with rods, mud rotary		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample		GROUND WATER DEPTH: Initial: mud rotary; Final: ---

DESCRIPTION OF EARTH MATERIALS Approx. Sta. 140+00, east bank crest	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
FAT CLAY (continued):	CH	61										
		62										
		63										
mottled dark gray (10YR 4/1) and very dark gray (10YR 3/1); grades coarser with depth		64	S D	48	2.75 3.75		52	27	33	100		
		65										
		66										
SANDY LEAN CLAY: Dark bluish gray (GLEY 2 4/10B) mottled with dark yellowish brown (10YR 3/4), wet, very stiff; with fine sand	CL	67										
		68										
		69	S D	21	2.5 2.6	59		22		104		
BOTTOM OF HOLE = 69.5 Feet Groundwater level was not measured because of mud rotary drilling		70										
		71										
		72										
		73										
		74										
		75										
		76										
		77										
		78										
		79										
		80										

DATE: 9/16/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-3
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 8" hollow stem auger		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon X = 2½" OD, 2" ID Split-spoon I = Standard Penetrometer (2" OD SPT) S = Slough in sample	GROUND WATER DEPTH: Initial: Not measured Final: 6.5 ft (1.5 hrs. after drilling)	

DESCRIPTION OF EARTH MATERIALS Approx. Sta. 153+50, west bank inboard maintenance road	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
FILL: CLAYEY GRAVEL with SAND: Imported road base; angular fine to coarse sand and gravel	GC	1	SD	31	4.5+ 4.5+							
LEAN CLAY with SAND to SANDY LEAN CLAY: Brown (10YR 4/3), moist, hard; with mostly fine sand	CL	2	DS									
		3	DD	16	4.5+ 2			23		99		
ALLUVIUM: Inter layered FAT CLAY, SILTY SAND and CLAYEY SAND: Very dark greenish gray (Gley1 3/5GY), moist to wet, stiff to hard clay to medium dense sand; fine-grained sand	CH, SM, SC	4										
		5	SD					26		93		
		6	DD	12	4.5+							
FAT CLAY: Dark grayish brown (10YR 4/2), moist to wet, stiff; minor intervals of clay with fine-grained sand	CH	7										
		8										
		9										
		10	SD									
		11	DD	18	1.75 1			28		96		
		12										
		13										
		14										
		15	SD									
dark yellowish brown (10YR 4/4)		16	DD	10	1.25		50	38 36	22	85	15	TXUU 1710
		17										
		18										
		19										
grayish brown (2.5Y 5/2)		20										

DATE: 9/16/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-3
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 8" hollow stem auger		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon X = 2½" OD, 2" ID Split-spoon I = Standard Penetrometer (2" OD SPT) S = Slough in sample	GROUND WATER DEPTH:	Initial: Not measured Final: 6.5 ft (1.5 hrs. after drilling)

DESCRIPTION OF EARTH MATERIALS Approx. Sta. 153+50, west bank inboard maintenance road	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
FAT CLAY (continued)**:**	CH	21	SD	32	3			23		105		
		22										
		23										
		24										
Dark grayish brown (2.5YR 4/2), mottled with dark greenish gray (Gley 2 4/5 BG); stiff to very stiff; wetness increases with depth		25										
		26	SD	26	1.75 2.6			23		108		
		27										
		28										
LEAN CLAY with SAND: Olive brown (2.5YR 4/3), wet, very soft; with fine sand	CL	29										
		30										
		31	SD	16	0.25	36*		19		114		
CLAYEY SAND: Olive brown (2.5YR 4/3), moist, medium dense; mostly fine sand * see Figure C-9 for sieve analysis results	SC	32										
		33										
BOTTOM OF HOLE = 31.5 Feet Groundwater at 6-1/2 feet (1.5 hours after completion of drilling)		34										
		35										
		36										
		37										
		38										
		39										
		40										

PACIFIC GEOTECHNICAL ENGINEERING	PAGE: 2 of 2

DATE: 9/16/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-4
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 8" hollow stem auger		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample	GROUND WATER DEPTH: Initial: --- Final: 7.9 ft (10 min. after drilling)	

DESCRIPTION OF EARTH MATERIALS (Approx. Sta. 164+00, west bank inboard maintenance road)	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
FILL: CLAYEY GRAVEL with SAND: Imported road base	GC	1										
CLAYEY SAND: Brown (10YR 4/3), moist, medium dense; rounded fine to coarse sand	SC	2	SD	27								
		3	DS									
LEAN CLAY with SAND: Mottled very dark gray (10YR 3/1), moist, stiff; with fine sand; root or wood fragment at 4 feet; grades slightly coarser with depth	CL	4	DD	13	1.5			17		113		
		5										
CLAYEY SAND: Black (2.5Y 2.5/1), moist to wet, loose; rounded medium to coarse sand in a clayey sand (fine sand) matrix	SC	6	SD	15	1.7 2							
		7	D									
FAT CLAY: Black (2.5Y 2.5/1), moist, very stiff; grades coarser and wetter with depth	CH	8										
		9										
wet, soft to very soft		10										
SILTY SAND to CLAYEY SAND: Very dark gray (2.5Y 3/1), wet, loose; fine sand; very	SM/ SC	11	SD	6	0.5							
		12	DS									
color change to olive brown (2.5Y 4/3) * see Figure C-10 for sieve analysis results		13	I	5		44*	22	22	5			
		14										
LEAN CLAY to FAT CLAY with SAND: Mottled dark yellowish brown (10YR 4/3), moist to wet, firm; with fine sand	CL/ CH	15										
		16	SD	13	0.6 0.5			28		96	15	TXUU 1642
		17	D									
		18										
		19										
		20										

DATE: 9/16/2008	LOG OF EXPLORATORY DRILL HOLE	BORING: B-4
PROJECT NAME: SCVWD Stevens Creek Levees FEMA Recertification		PROJECT NUMBER: 2227E
DRILL RIG: CME 75, 140# auto hammer		LOGGED BY: CSS
HOLE DIAMETER: 8" hollow stem auger		HOLE ELEVATION: ---
SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample	GROUND WATER DEPTH:	Initial: ---; Final: 7.9 ft (10 min. after drilling)

DESCRIPTION OF EARTH MATERIALS Approx. Sta. 164+00, west bank inboard maintenance road	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
LEAN CLAY to FAT CLAY with SAND: (continued)	CL/CH	21	SD	24	2.5	79		24		105		
		22										
		23										
WELL GRADED SAND with GRAVEL and CLAY: Dark yellowish brown (10YR 3/4 to 4/6), wet, dense; mostly fine to coarse rounded sand with fine gravel * see Figure C-11 for sieve analysis results	SW-SC	24										
		25	SD	50/6"		9*		10		132		
		26										
		27										
LEAN CLAY: Mottled dark yellowish brown (10YR 4/4), moist, stiff to very stiff	CL	28										
		29										
		30										
		31	SD	37	1.5 2.6		36	21	17	107		
BOTTOM OF HOLE = 31.5 Feet Groundwater at 7.9 feet (10 minutes after completion of drilling)		32										
		33										
		34										
		35										
		36										
		37										
		38										
		39										
		40										

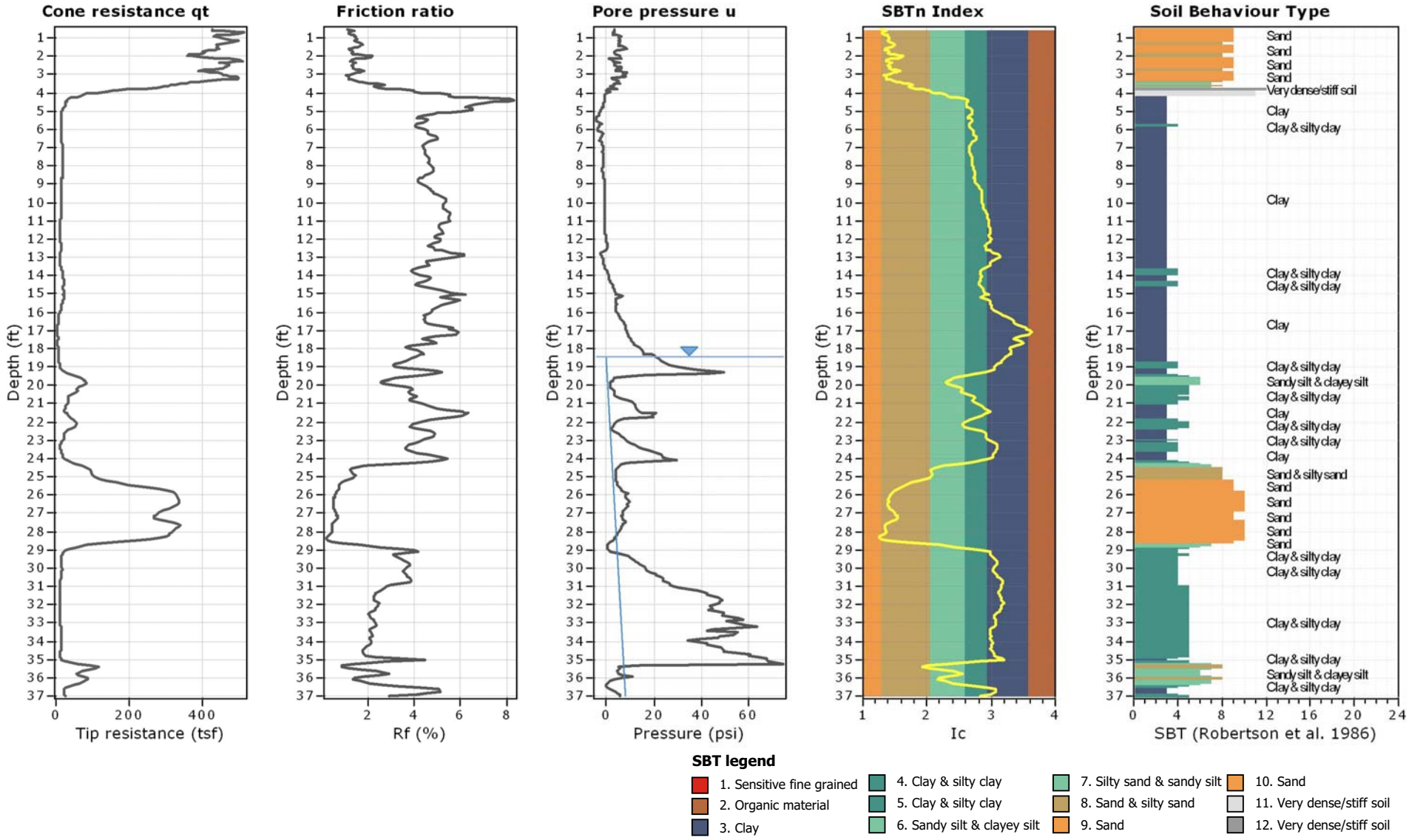
PACIFIC GEOTECHNICAL ENGINEERING	PAGE: 2 of 2

ATTACHMENT C.2

Cone Penetration Test Logs

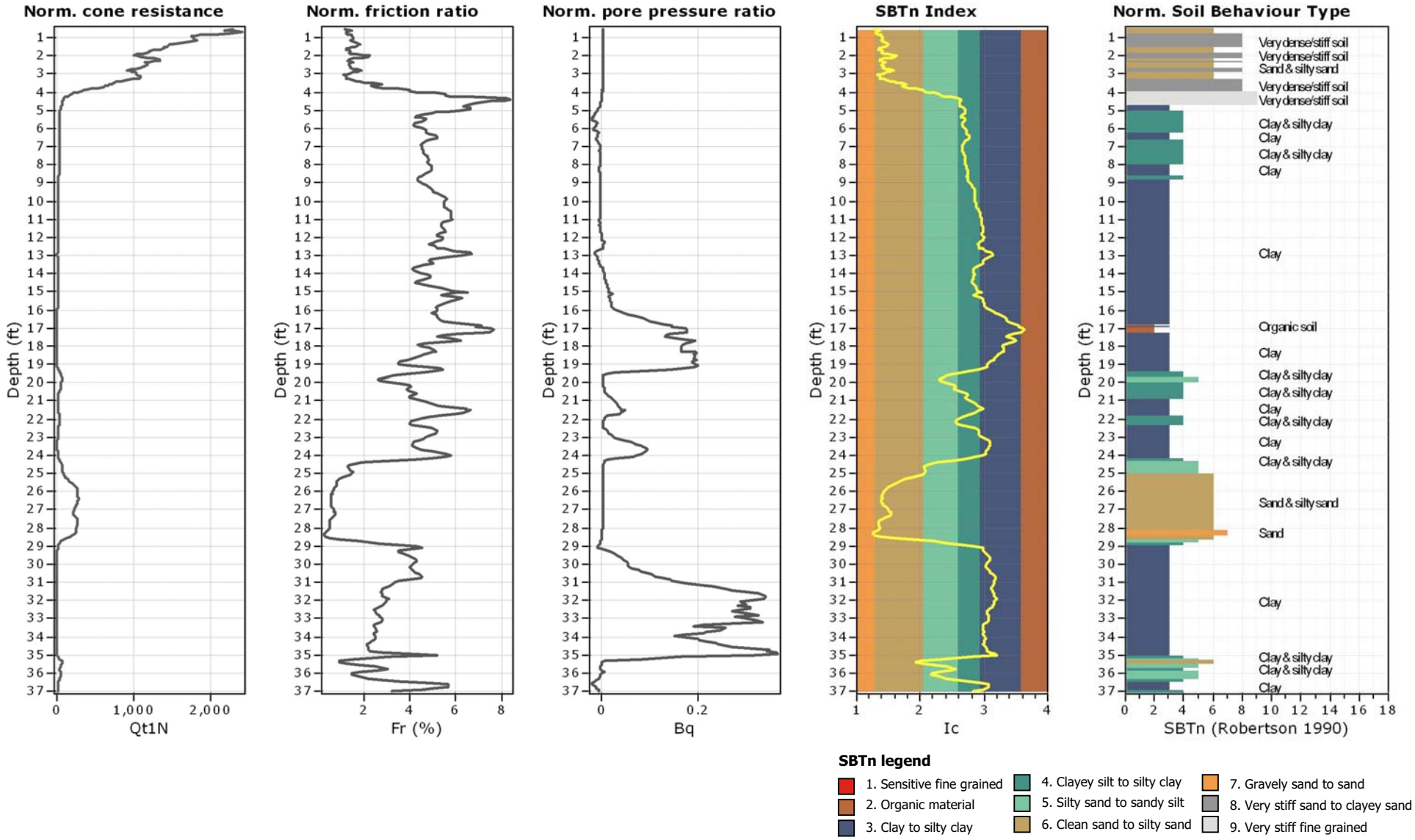
Project: Stevens Creek Levee

CPT: CPT-01 - Total depth: 37.00 (ft)



Project: Stevens Creek Levee

CPT: CPT-01 - Total depth: 37.00 (ft)

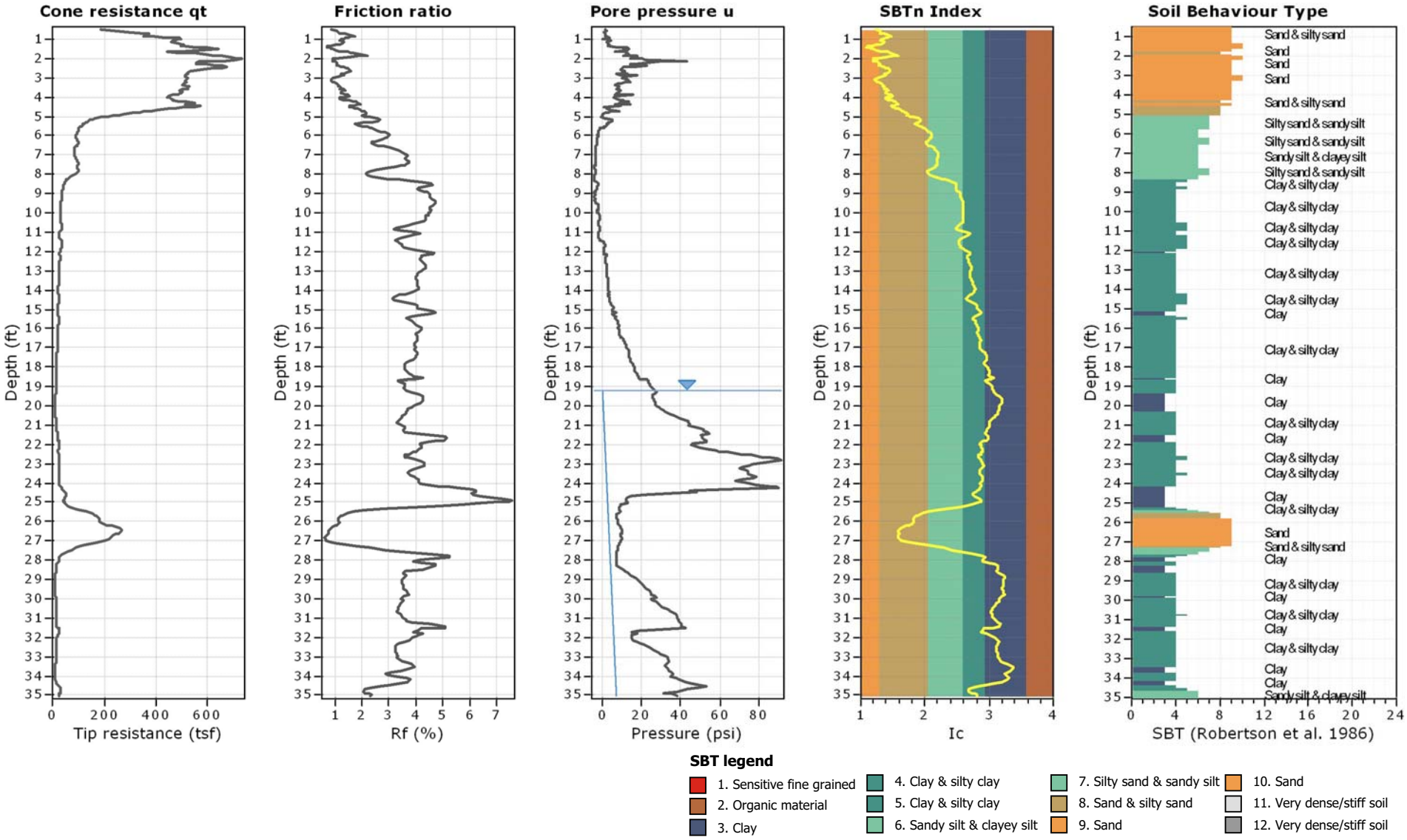


CPeT-IT v.1.6.0.68 - CPTU data presentation & interpretation software - Report created on: 5/1/2009, 9:58:31 AM

Project file: I:\Project\13000\13815.002\5000 INVESTIGATION, Recon, Field, Lab\CPTs\Stevens_Creek_CPTs.cpt

Project: Stevens Creek Levee

CPT: CPT-02 - Total depth: 35.04 (ft)

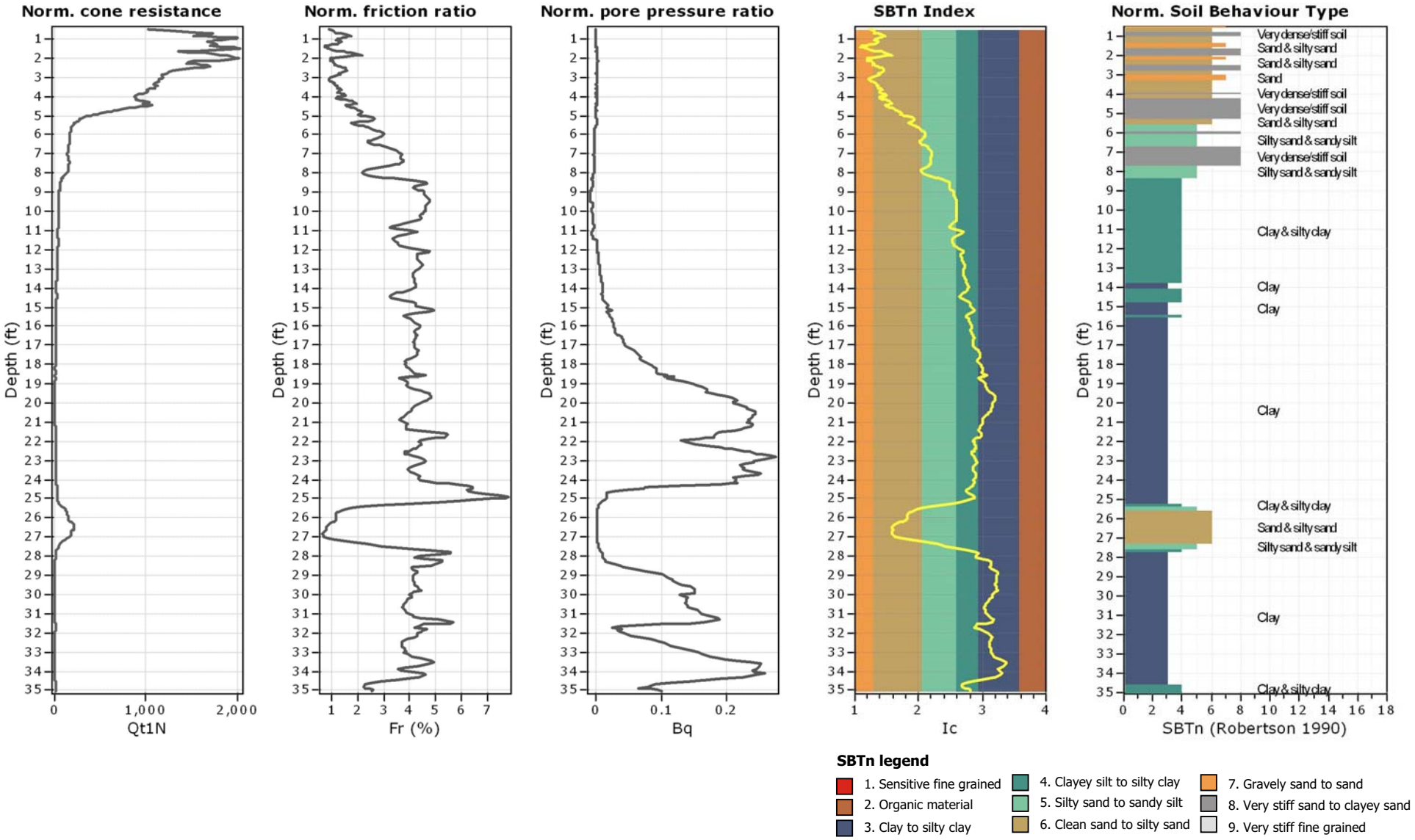


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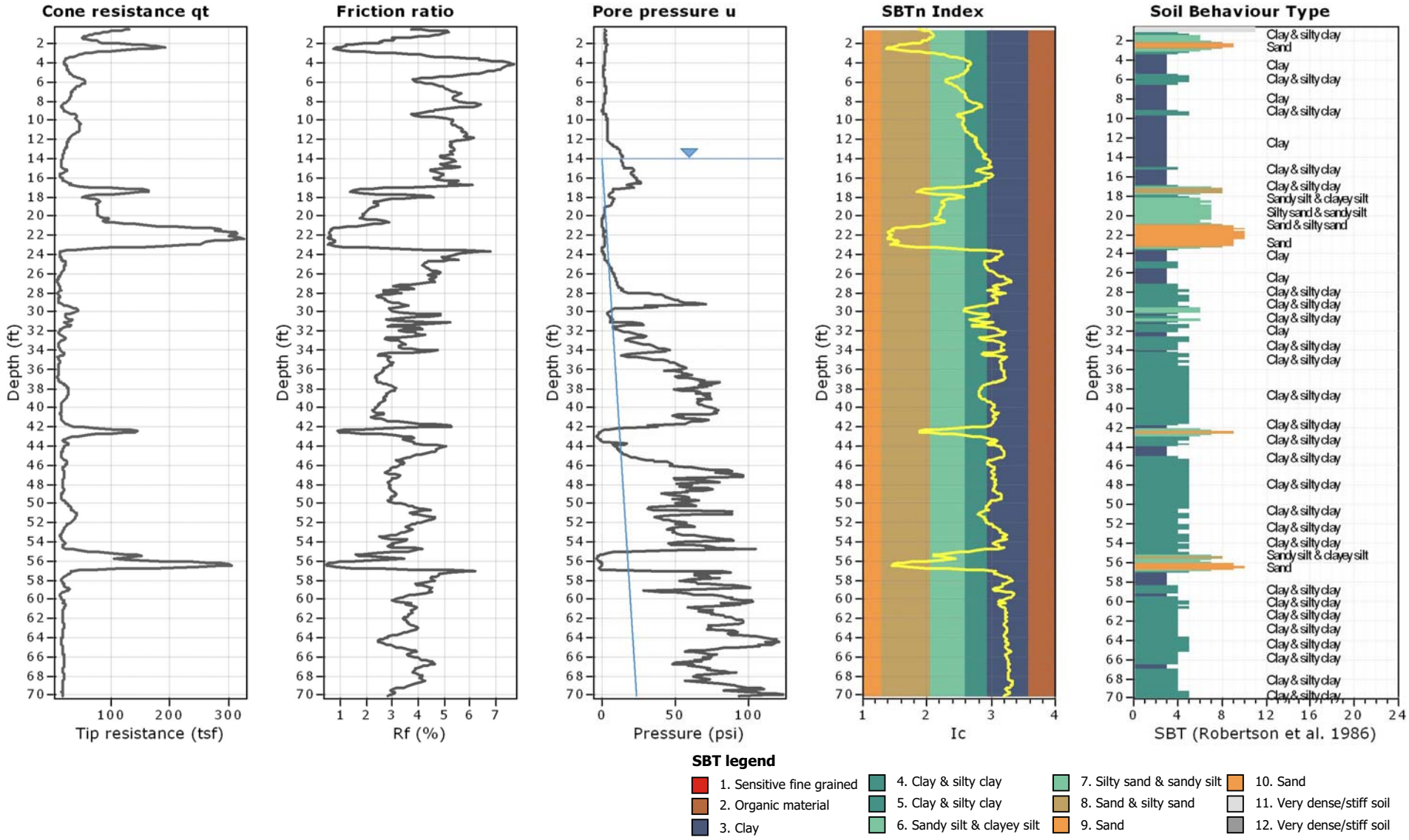
Project: Stevens Creek Levee

CPT: CPT-02 - Total depth: 35.04 (ft)



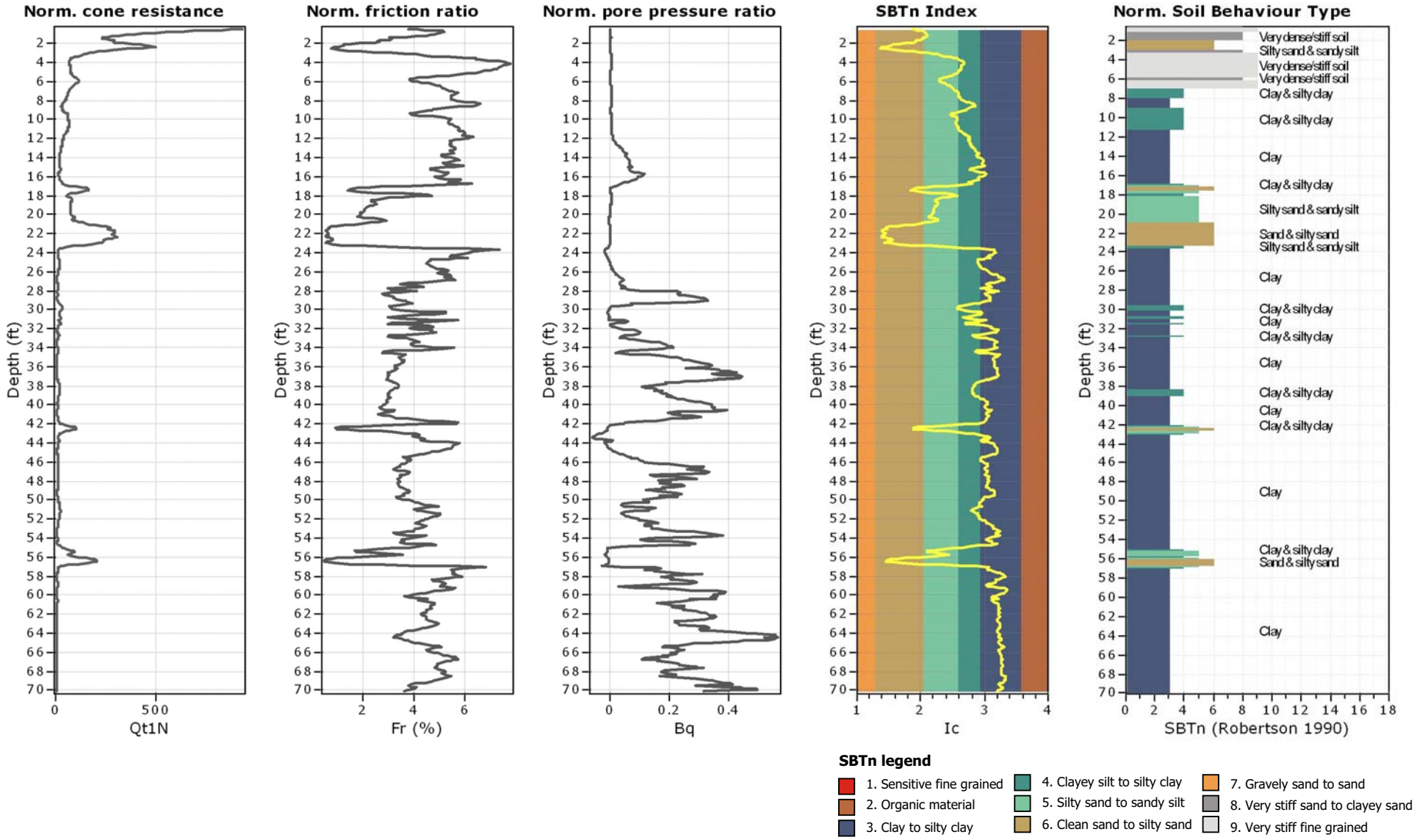
Project: Stevens Creek Levee

CPT: CPT-03 - Total depth: 70.08 (ft)



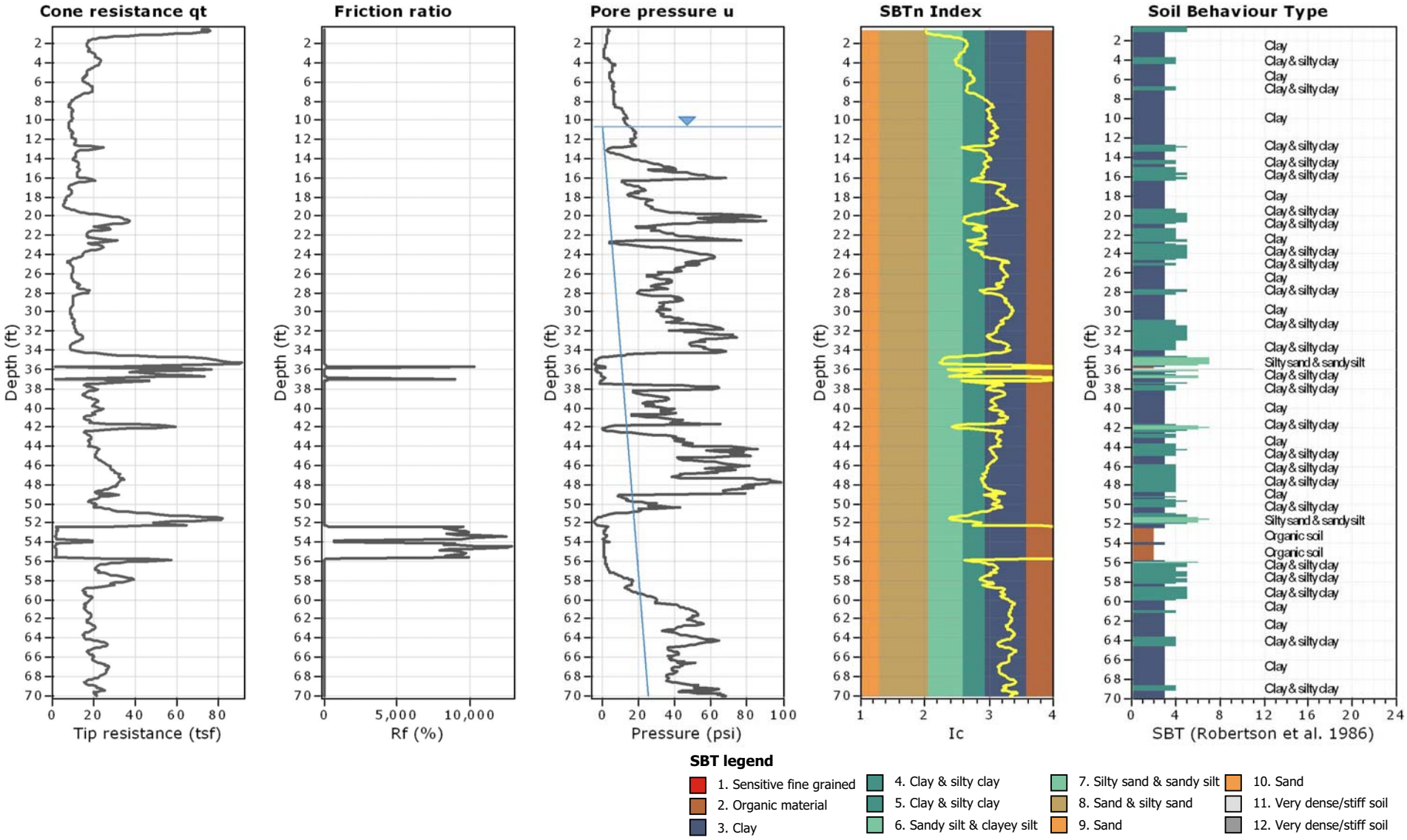
Project: Stevens Creek Levee

CPT: CPT-03 - Total depth: 70.08 (ft)



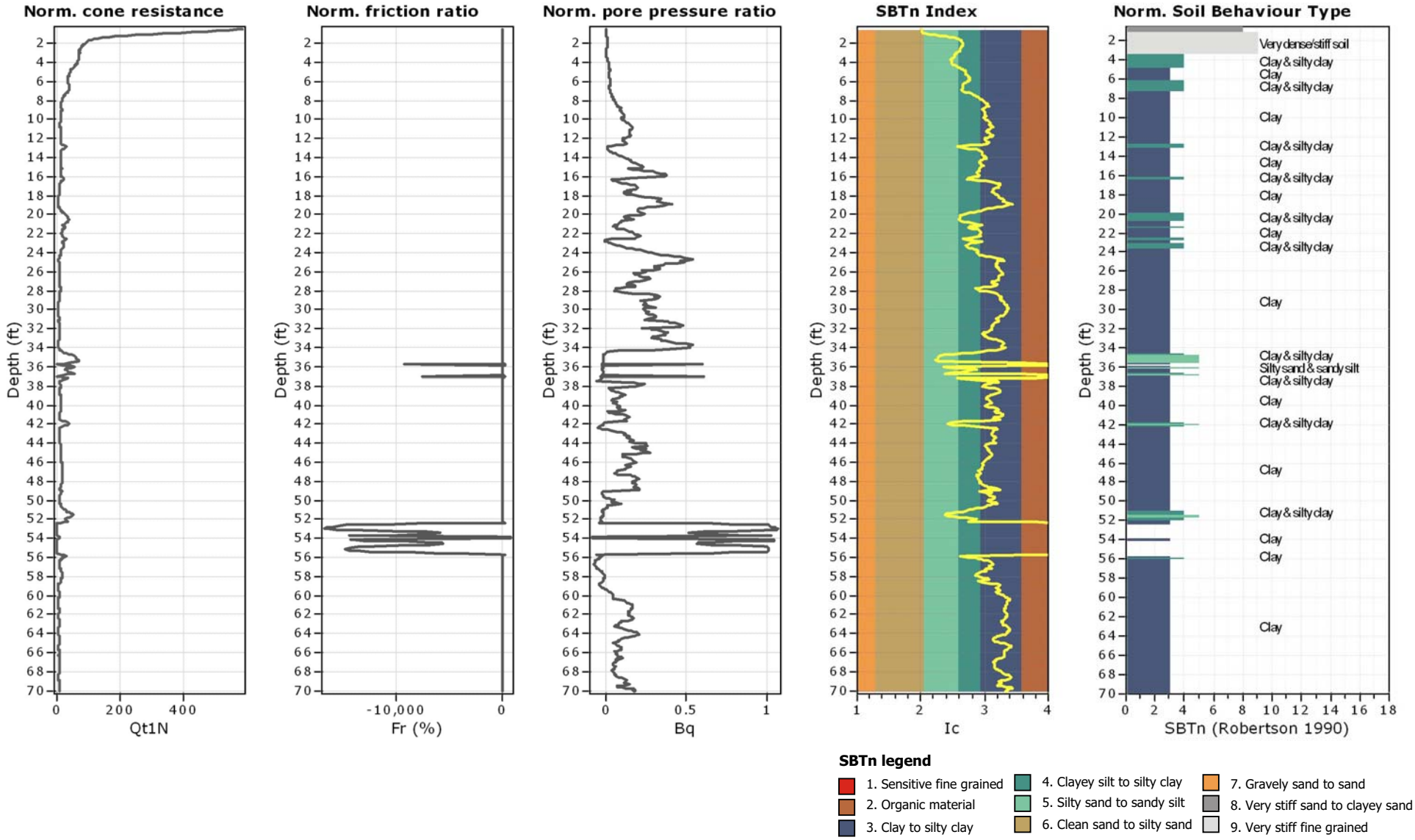
Project: Stevens Creek Levee

CPT: CPT-04 - Total depth: 70.06 (ft)



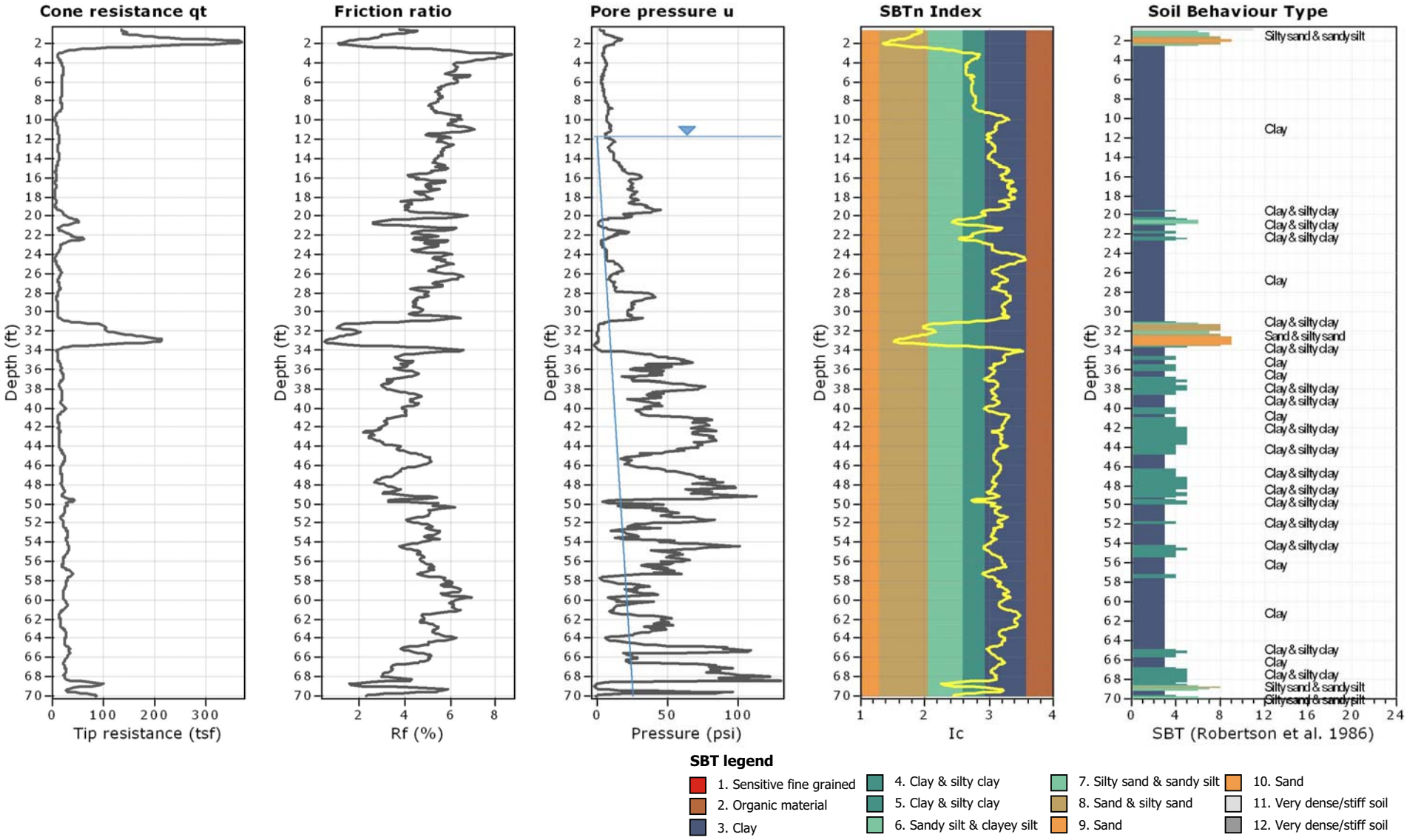
Project: Stevens Creek Levee

CPT: CPT-04 - Total depth: 70.06 (ft)



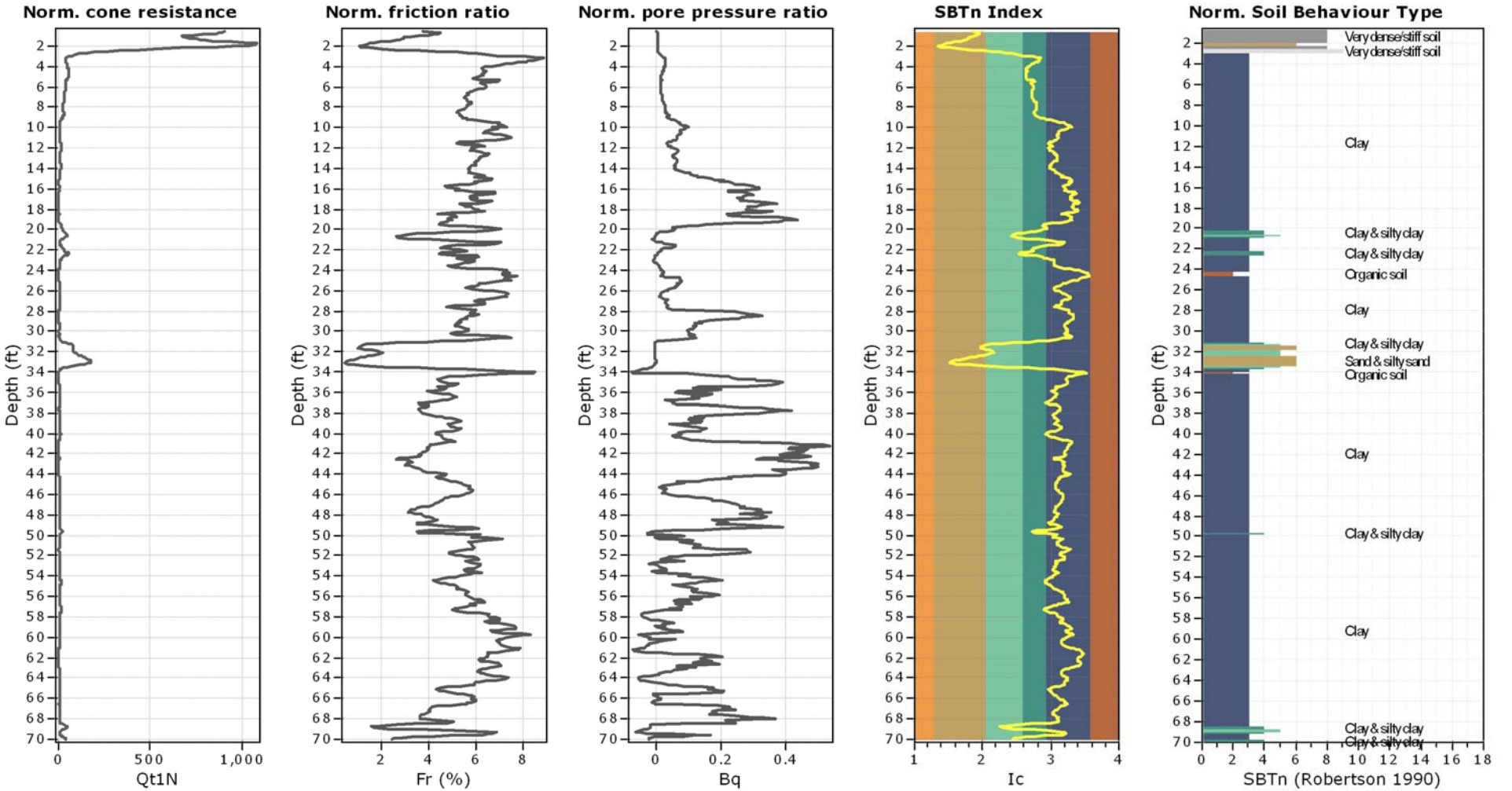
Project: Stevens Creek Levee

CPT: CPT-05 - Total depth: 70.02 (ft)



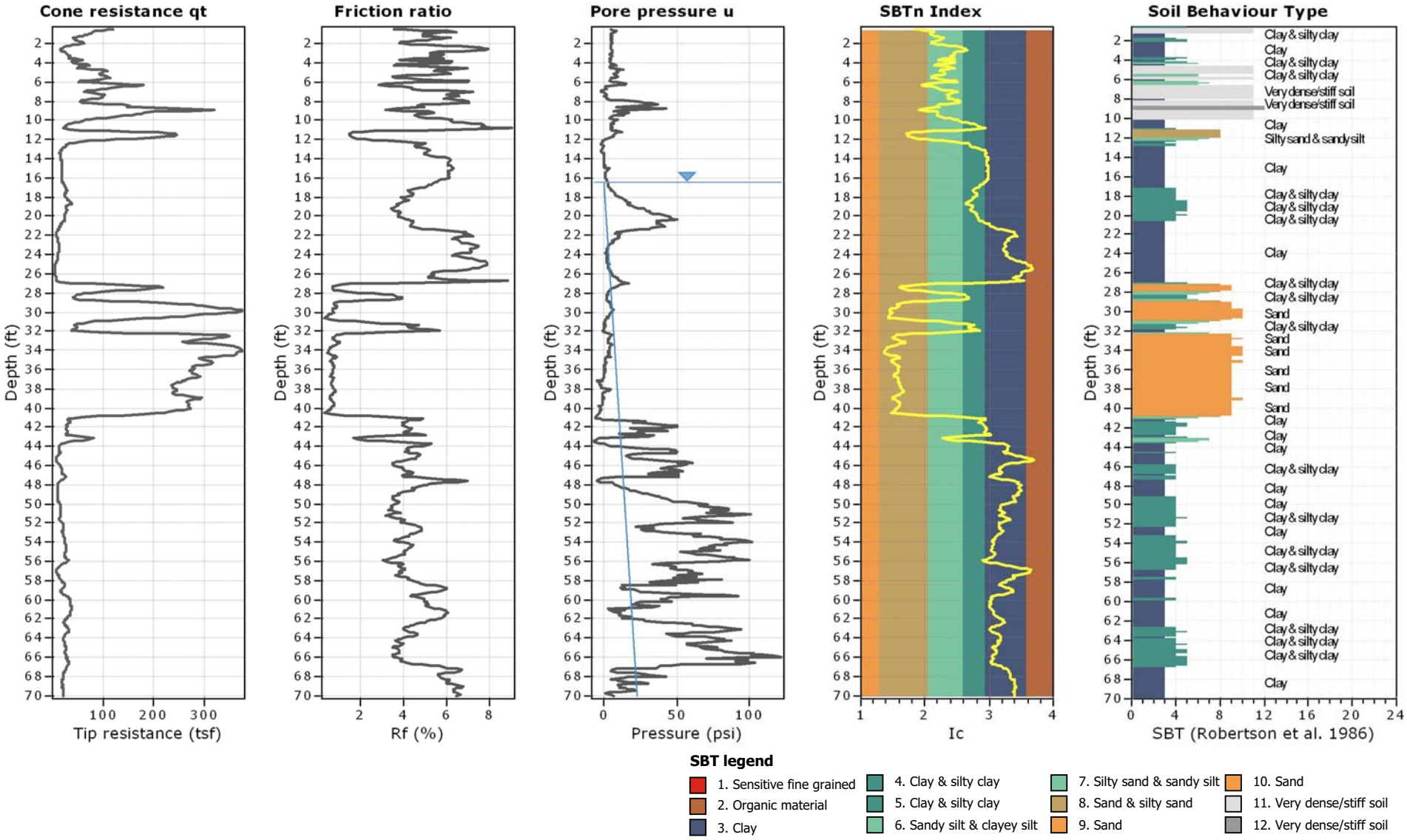
Project: Stevens Creek Levee

CPT: CPT-05 - Total depth: 70.02 (ft)



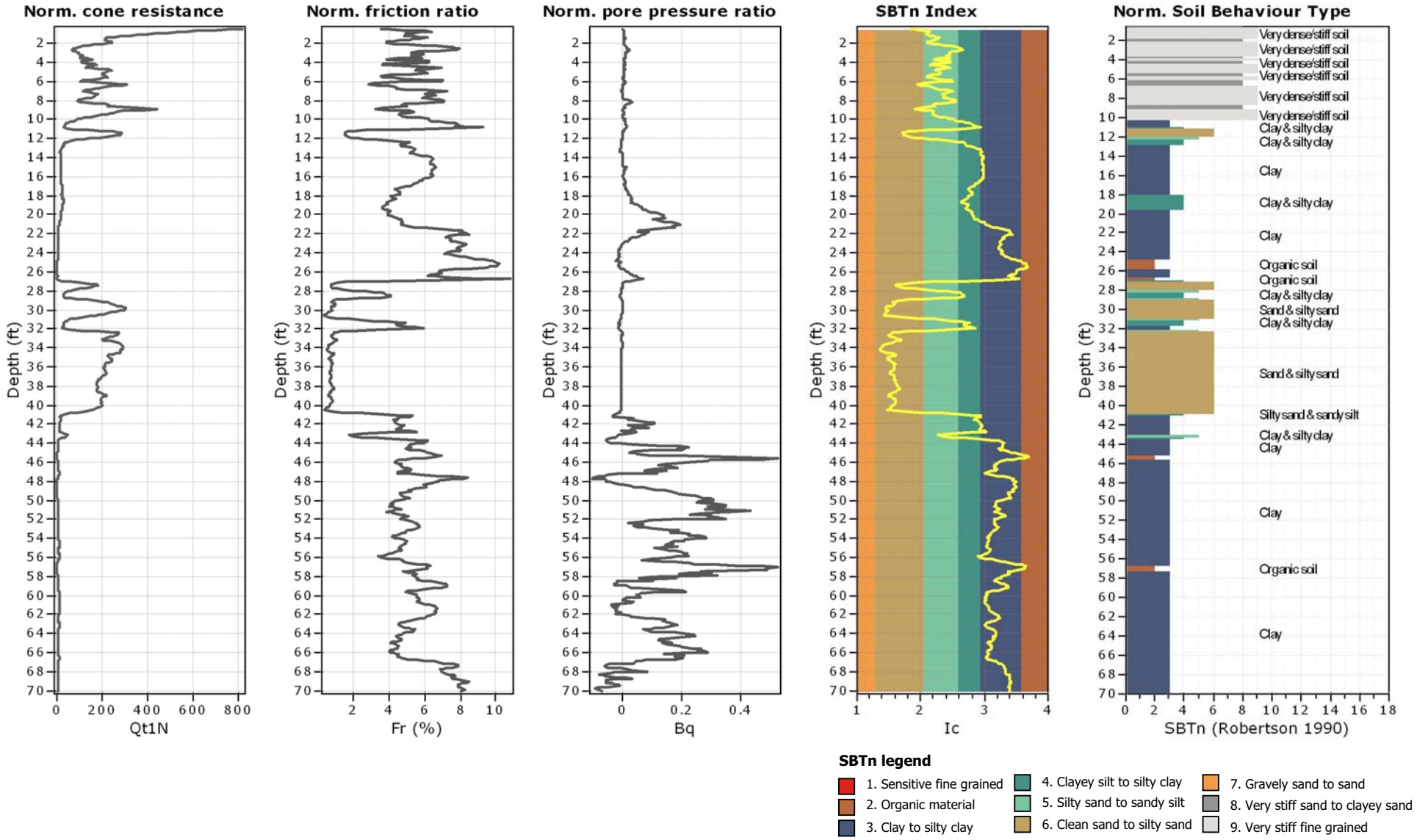
Project: Stevens Creek Levee

CPT: CPT-06 - Total depth: 70.04 (ft)



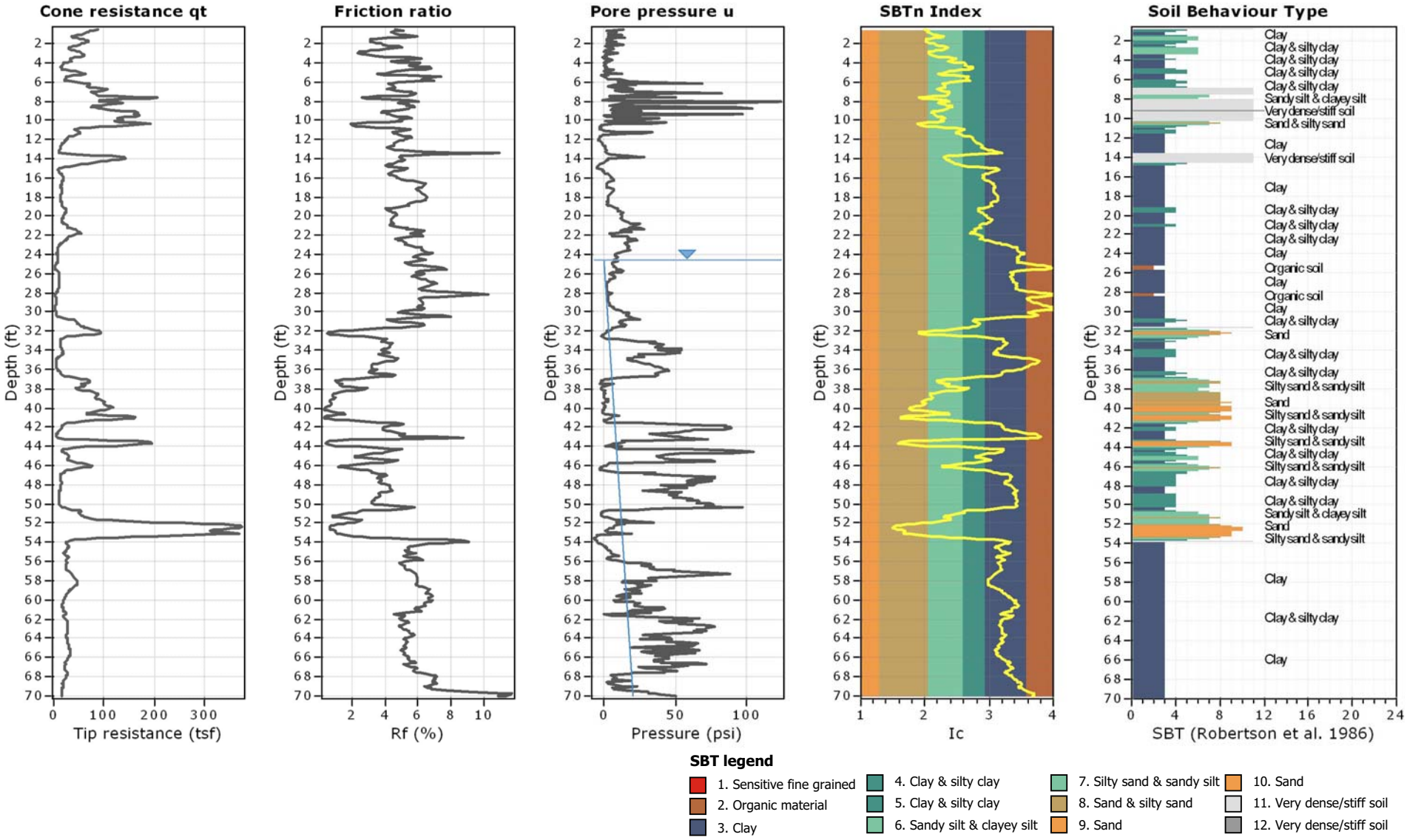
Project: Stevens Creek Levee

CPT: CPT-06 - Total depth: 70.04 (ft)



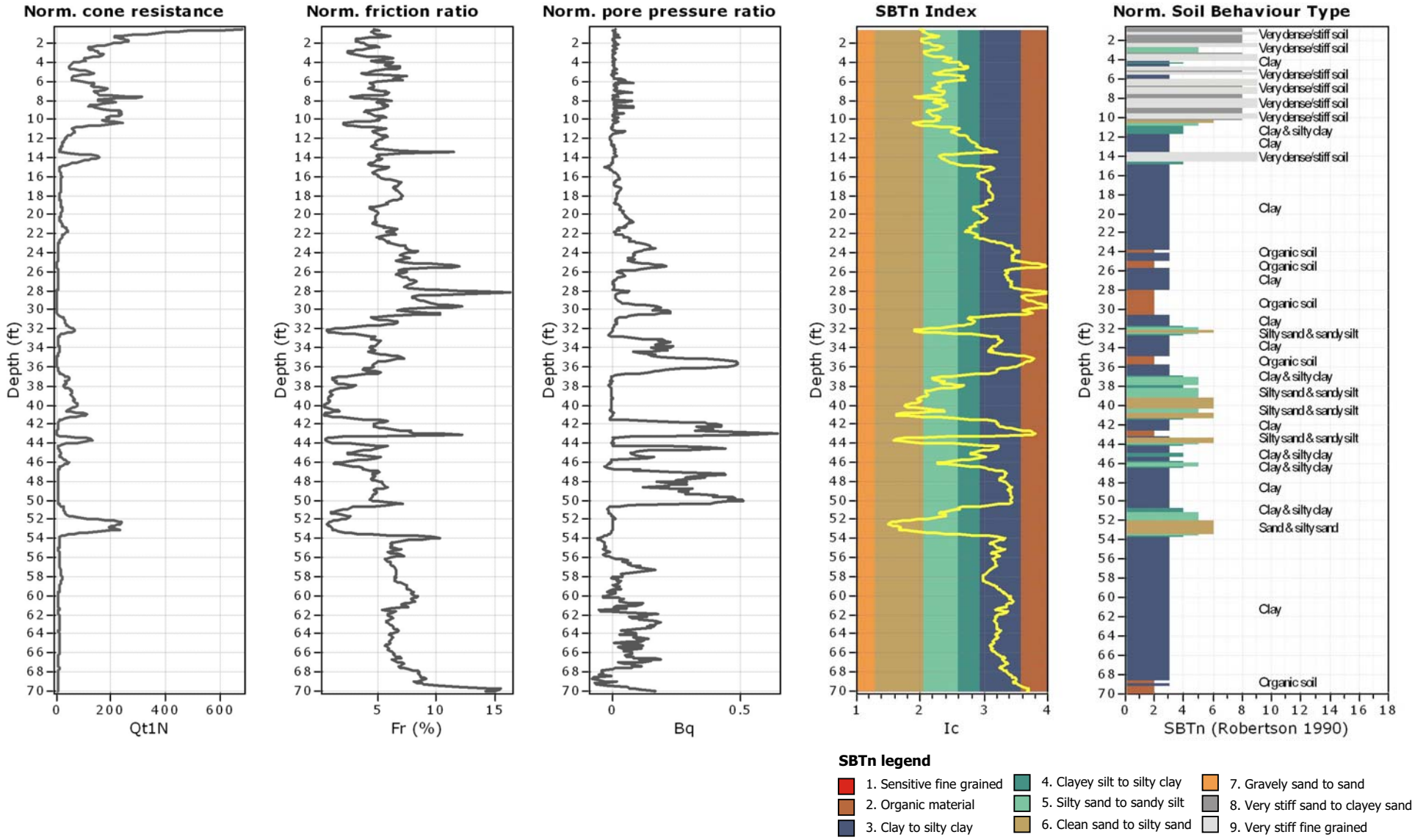
Project: Stevens Creek Levee

CPT: CPT-07 - Total depth: 70.03 (ft)



Project: Stevens Creek Levee

CPT: CPT-07 - Total depth: 70.03 (ft)

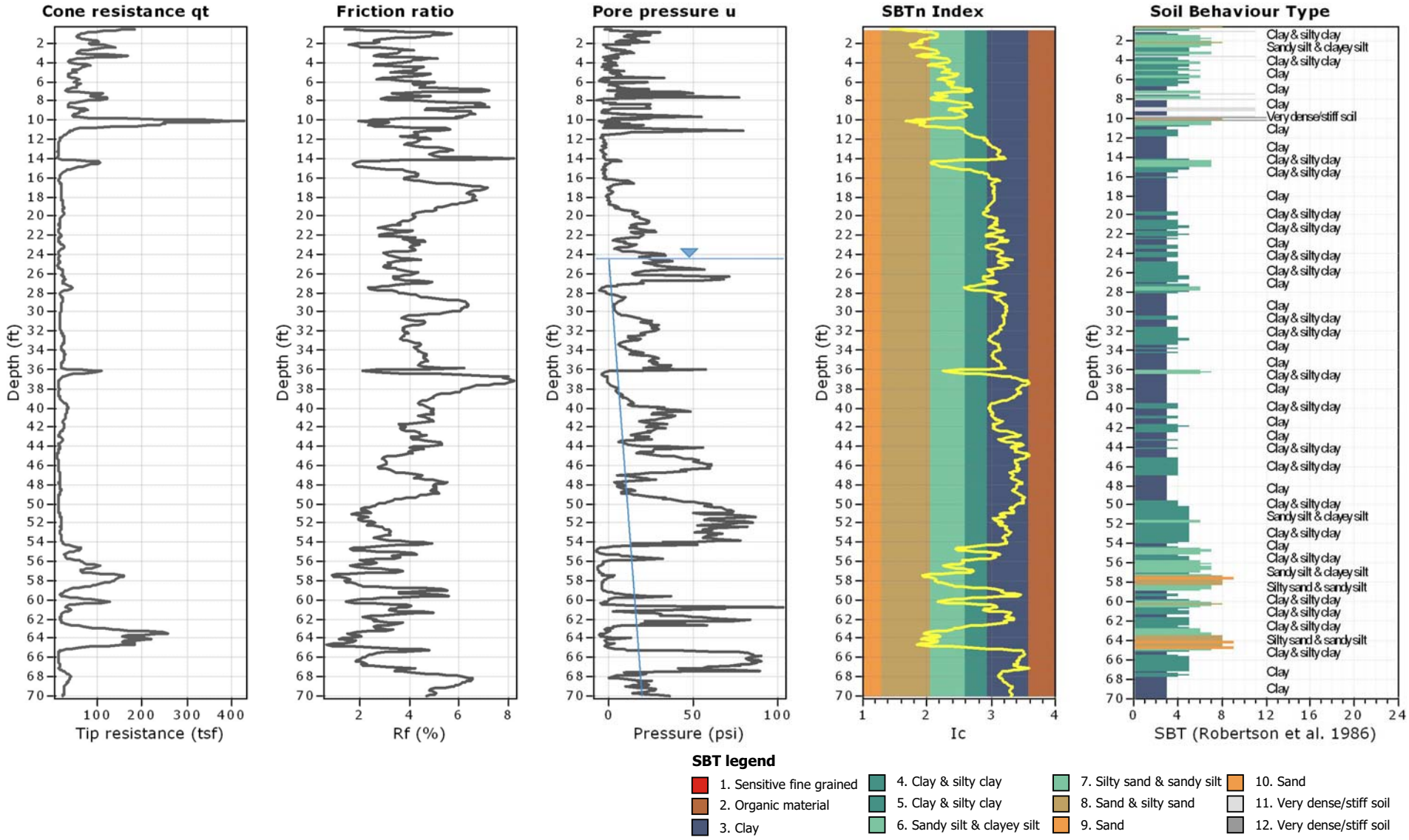


SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

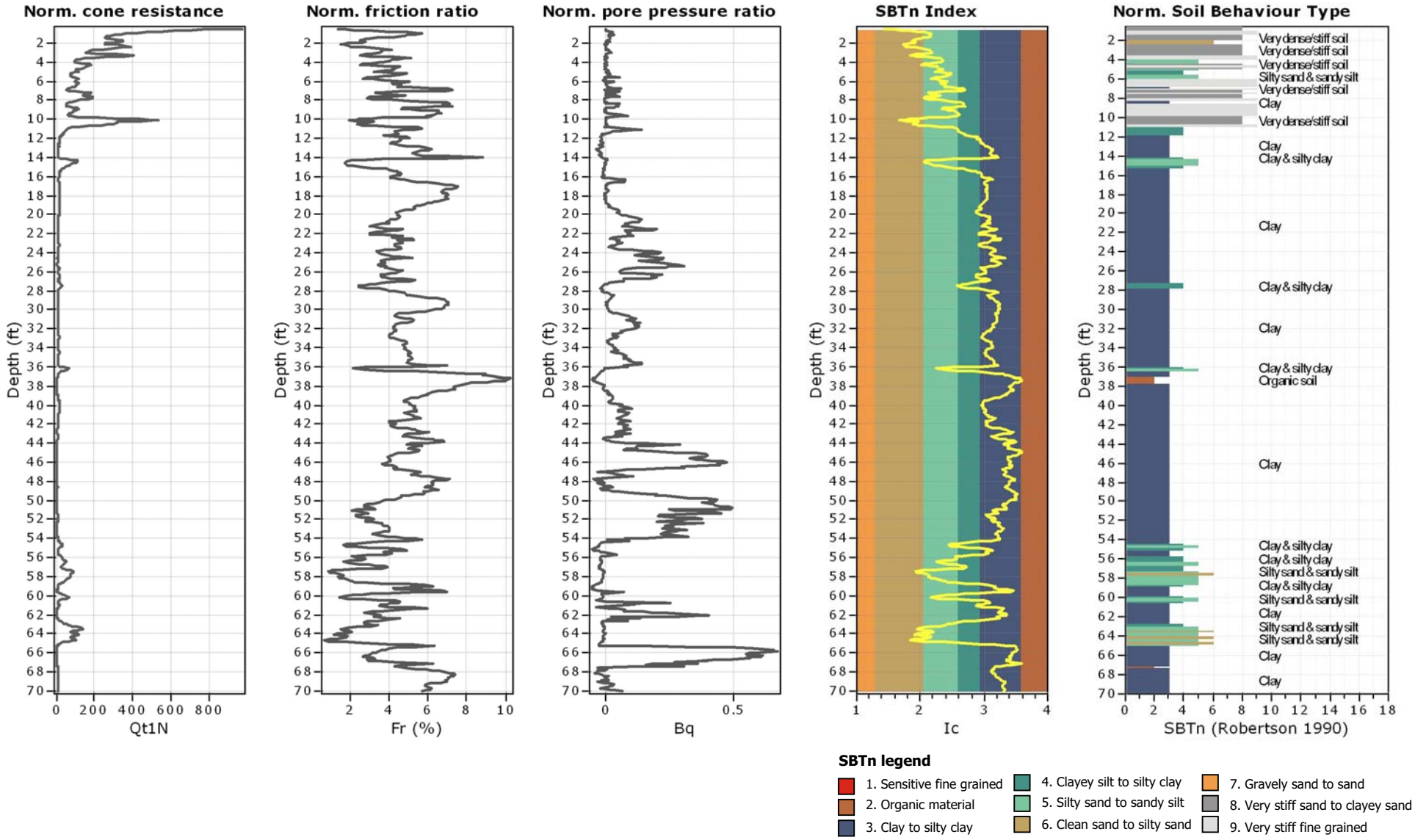
Project: Stevens Creek Levee

CPT: CPT-08 - Total depth: 70.03 (ft)



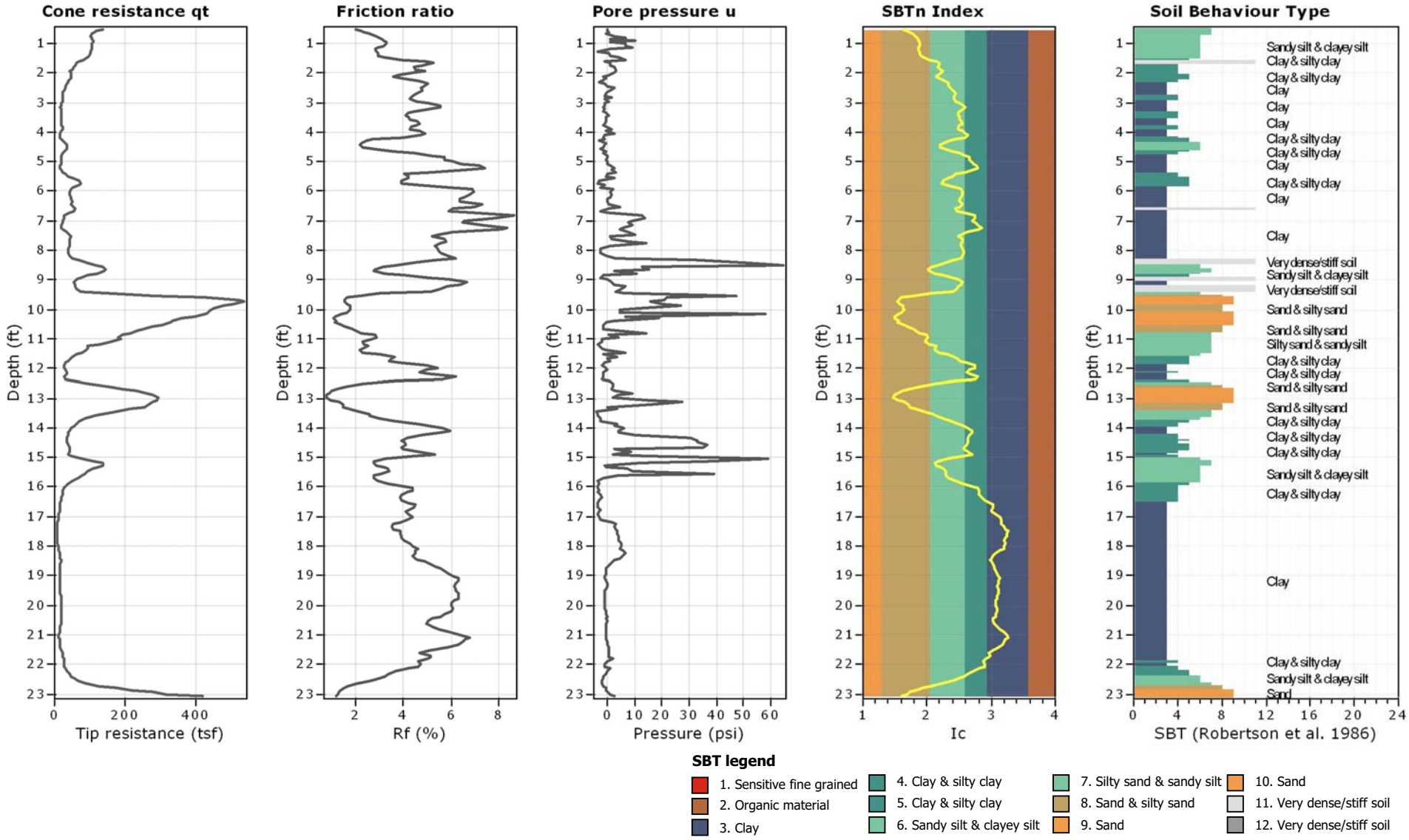
Project: Stevens Creek Levee

CPT: CPT-08 - Total depth: 70.03 (ft)



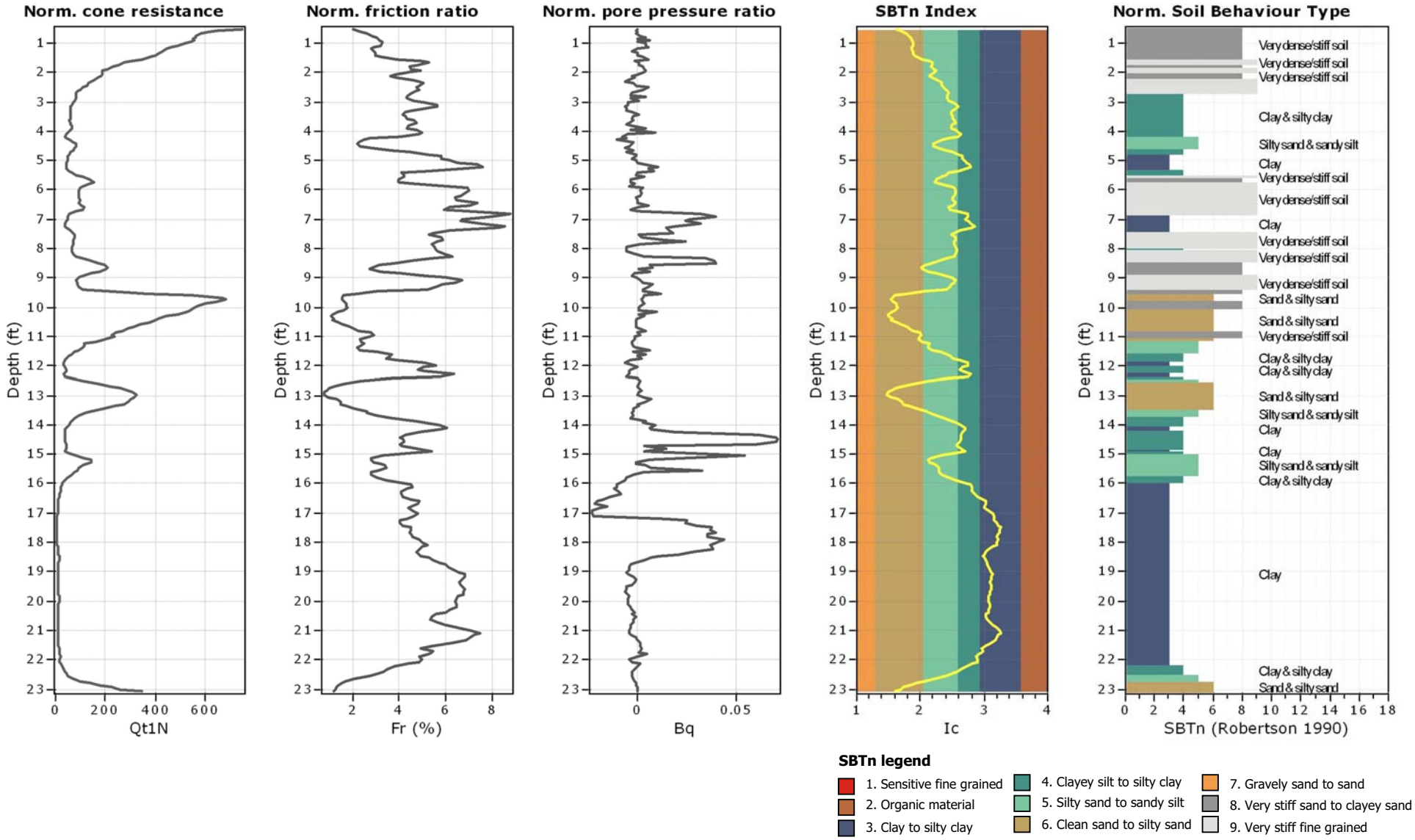
Project: Stevens Creek Levee

CPT: CPT-09A - Total depth: 23.07 (ft)



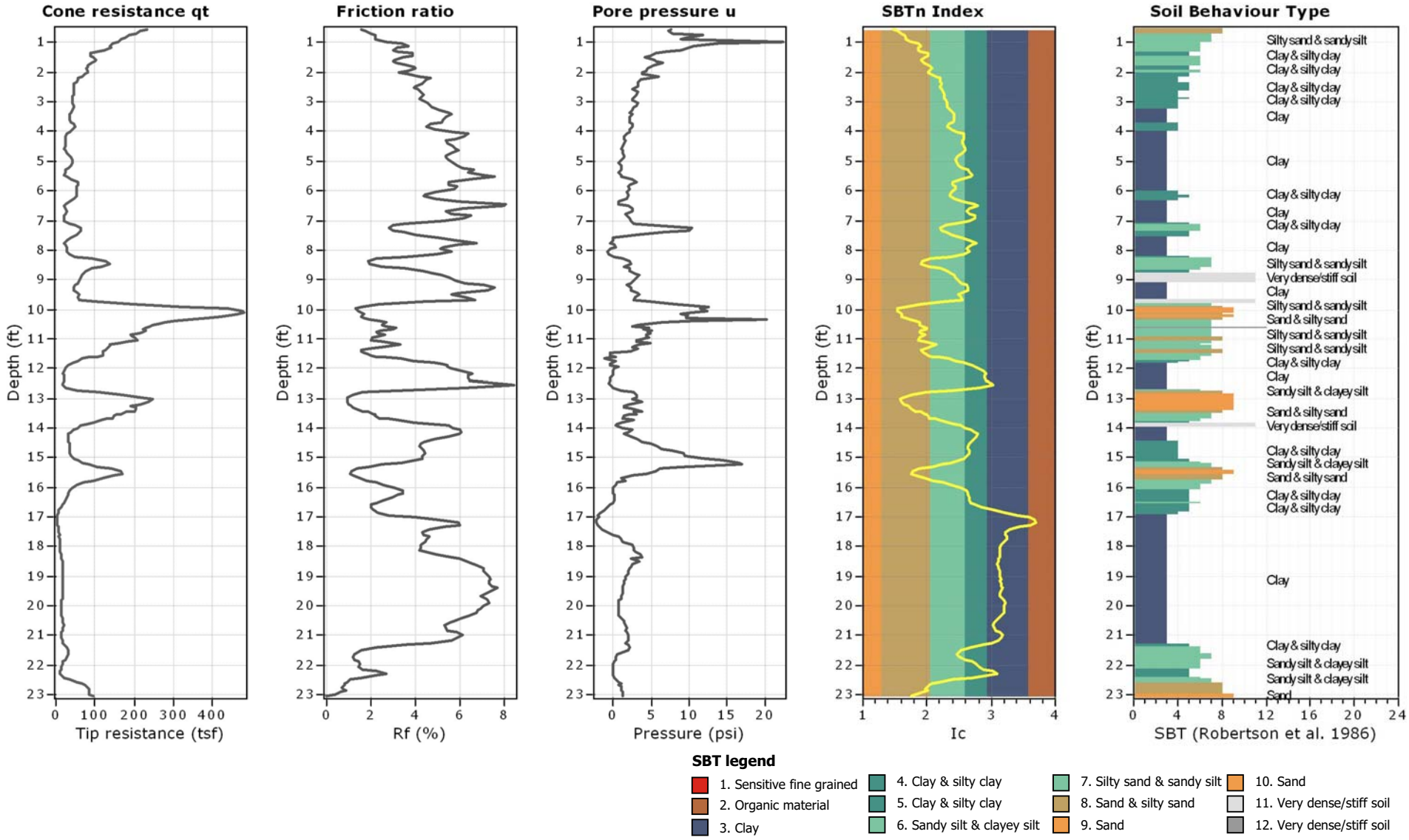
Project: Stevens Creek Levee

CPT: CPT-09A - Total depth: 23.07 (ft)



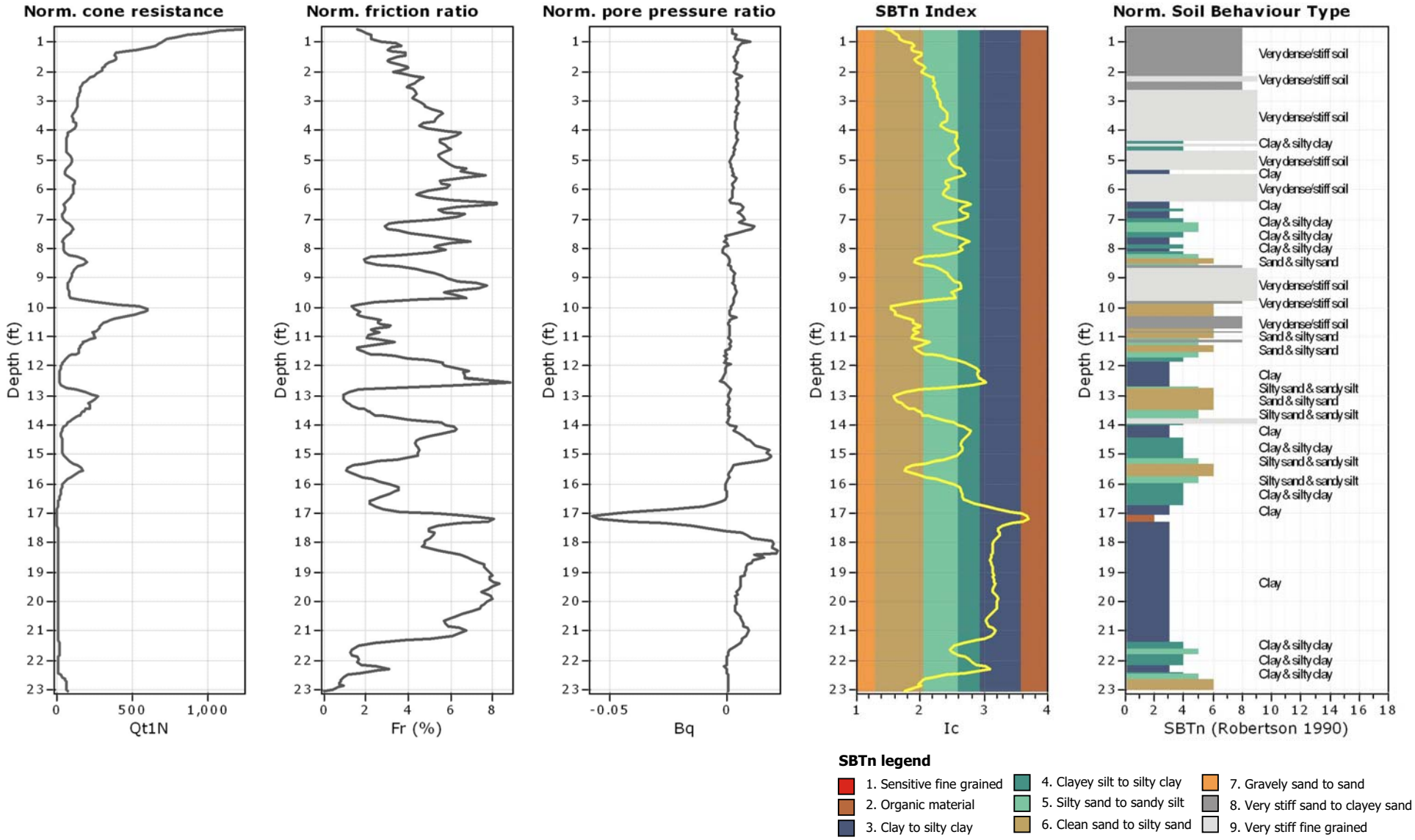
Project: Stevens Creek Levee

CPT: CPT-09B - Total depth: 23.04 (ft)



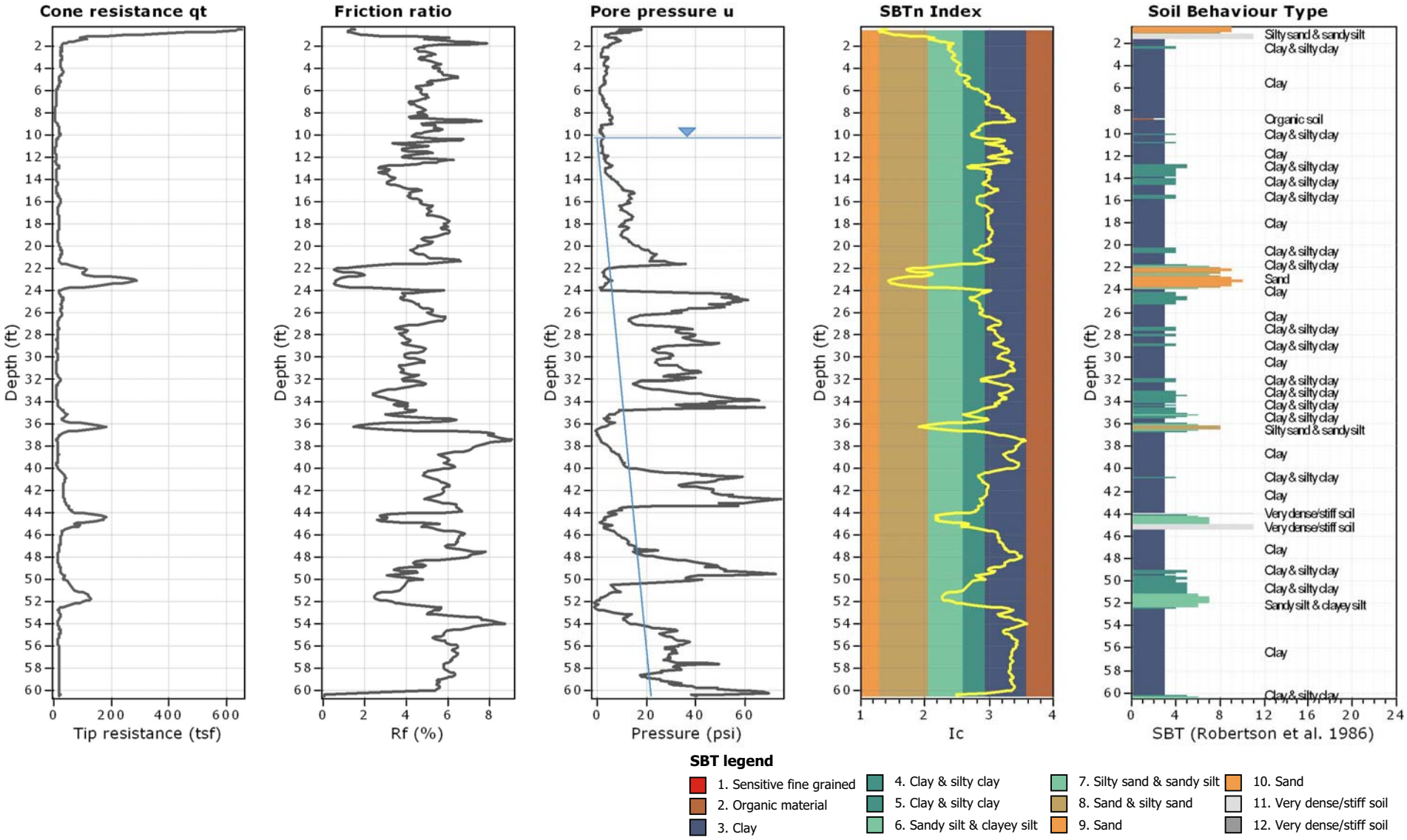
Project: Stevens Creek Levee

CPT: CPT-09B - Total depth: 23.04 (ft)



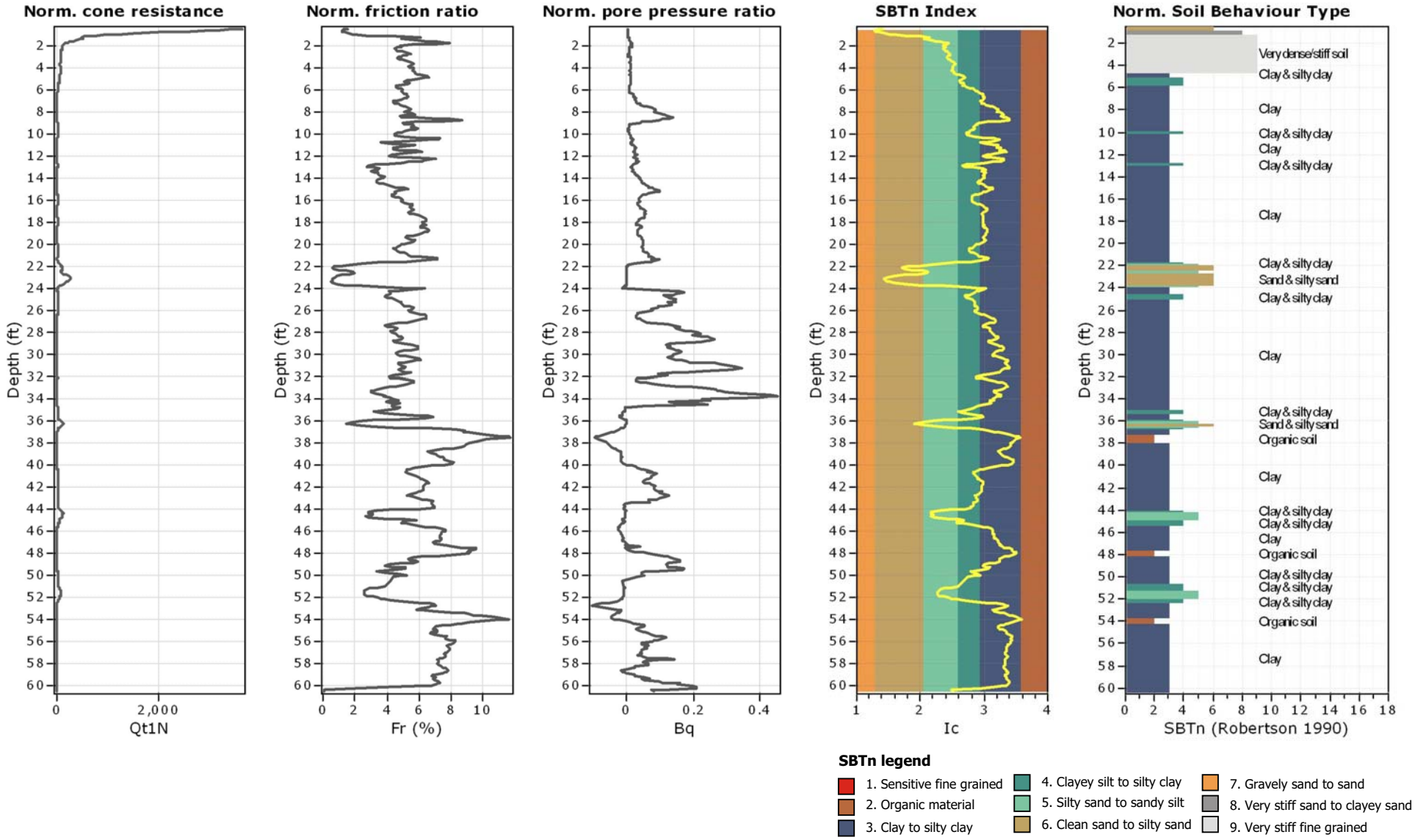
Project: Stevens Creek Levee

CPT: CPT-09C - Total depth: 60.53 (ft)



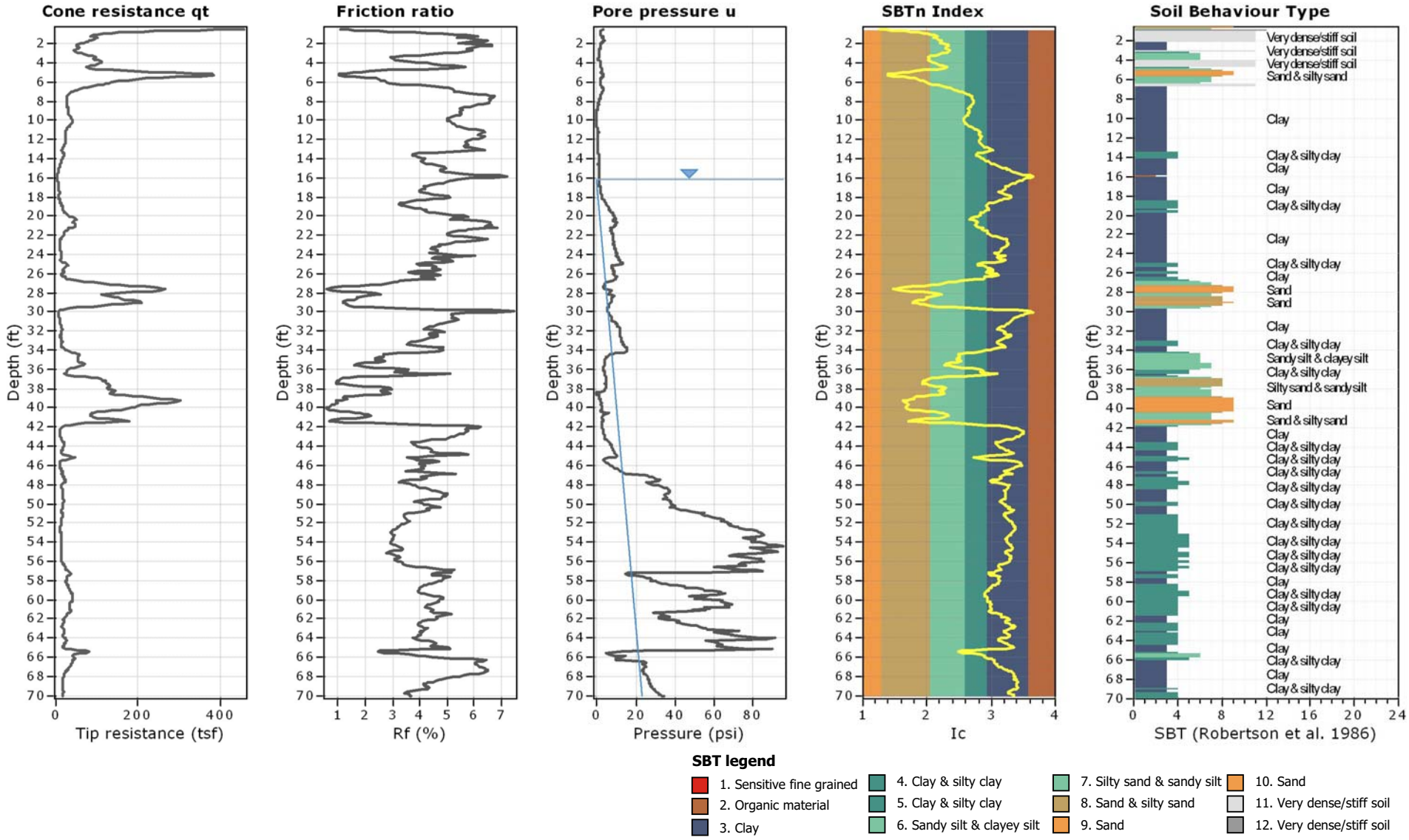
Project: Stevens Creek Levee

CPT: CPT-09C - Total depth: 60.53 (ft)



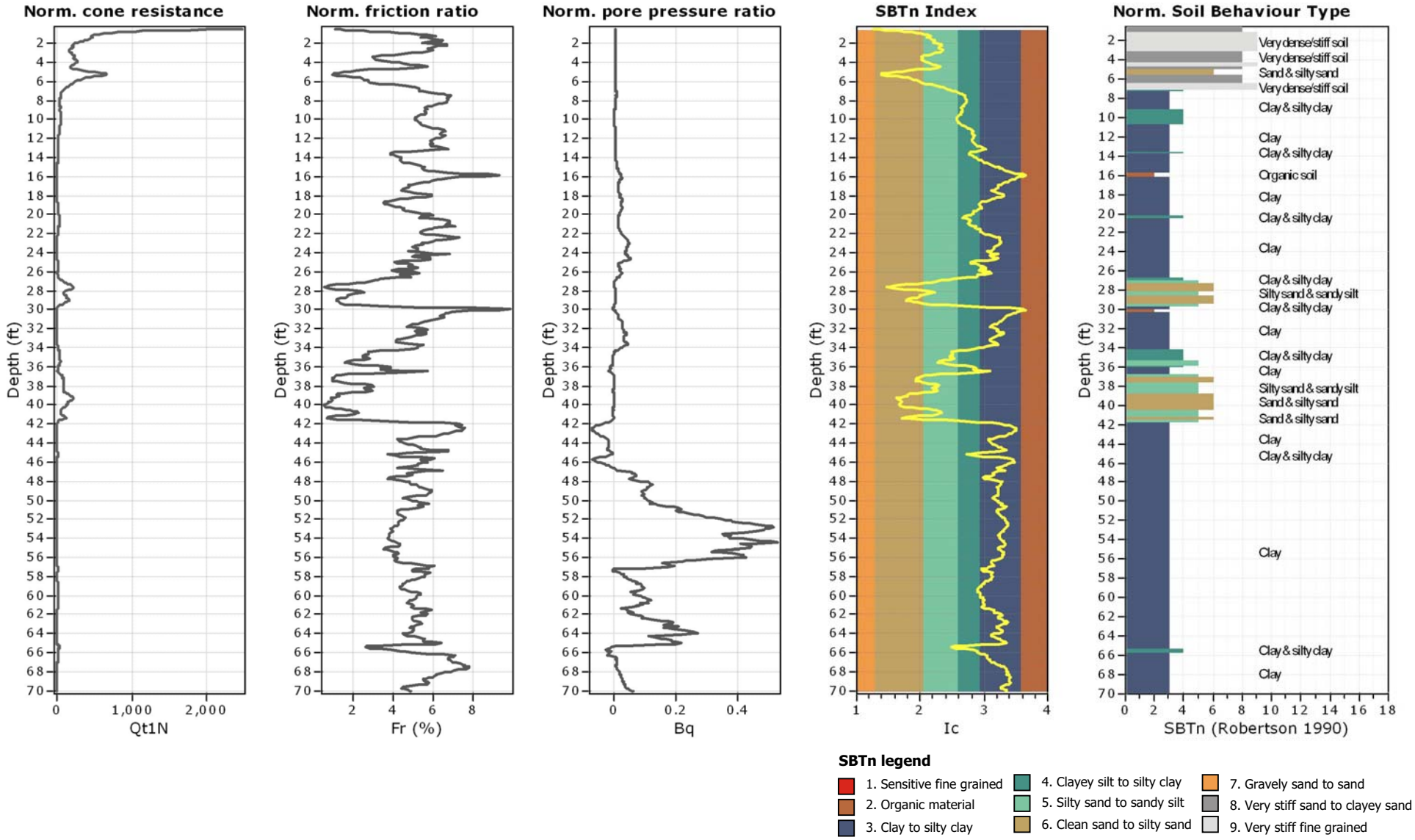
Project: Stevens Creek Levee

CPT: CPT-10 - Total depth: 70.05 (ft)



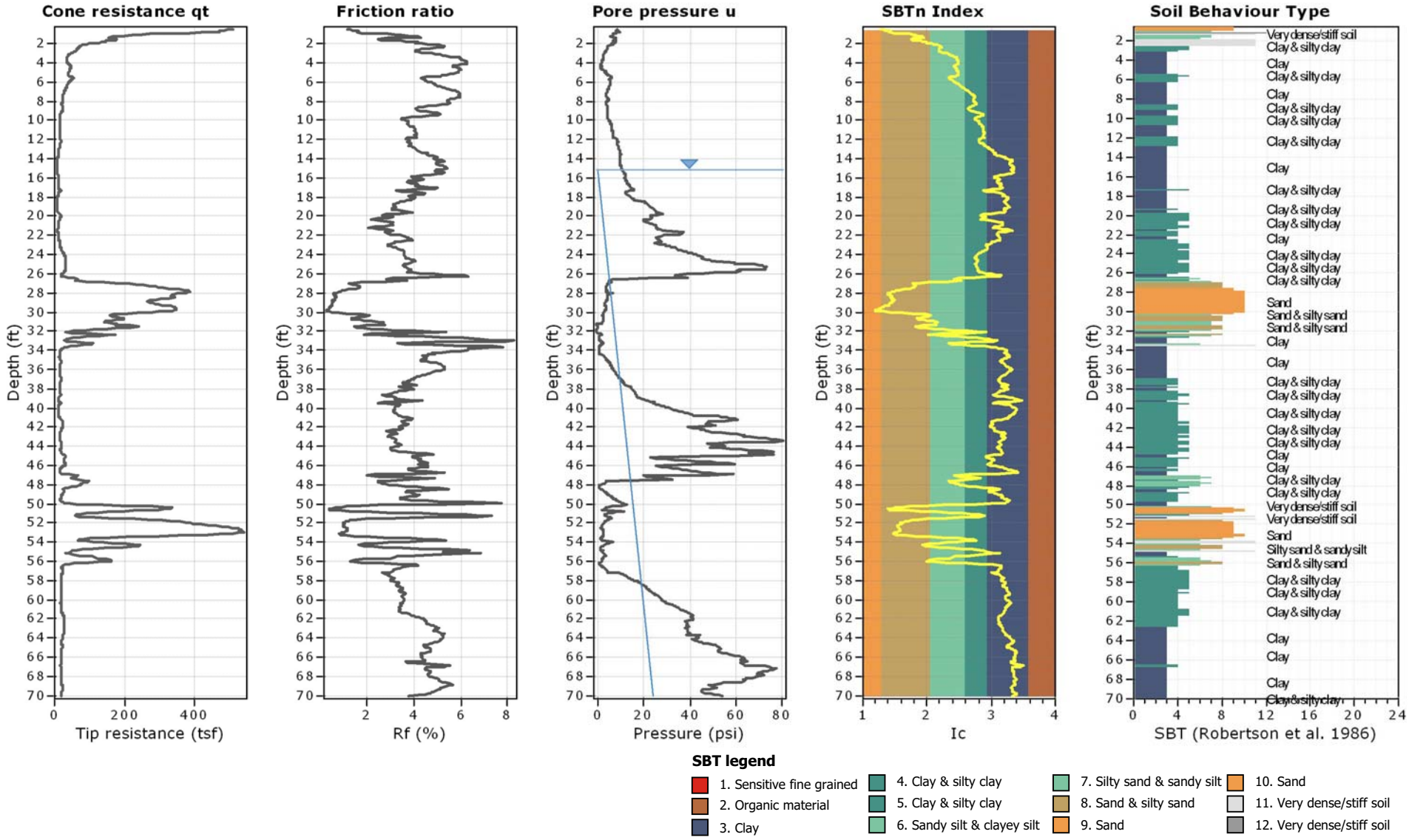
Project: Stevens Creek Levee

CPT: CPT-10 - Total depth: 70.05 (ft)



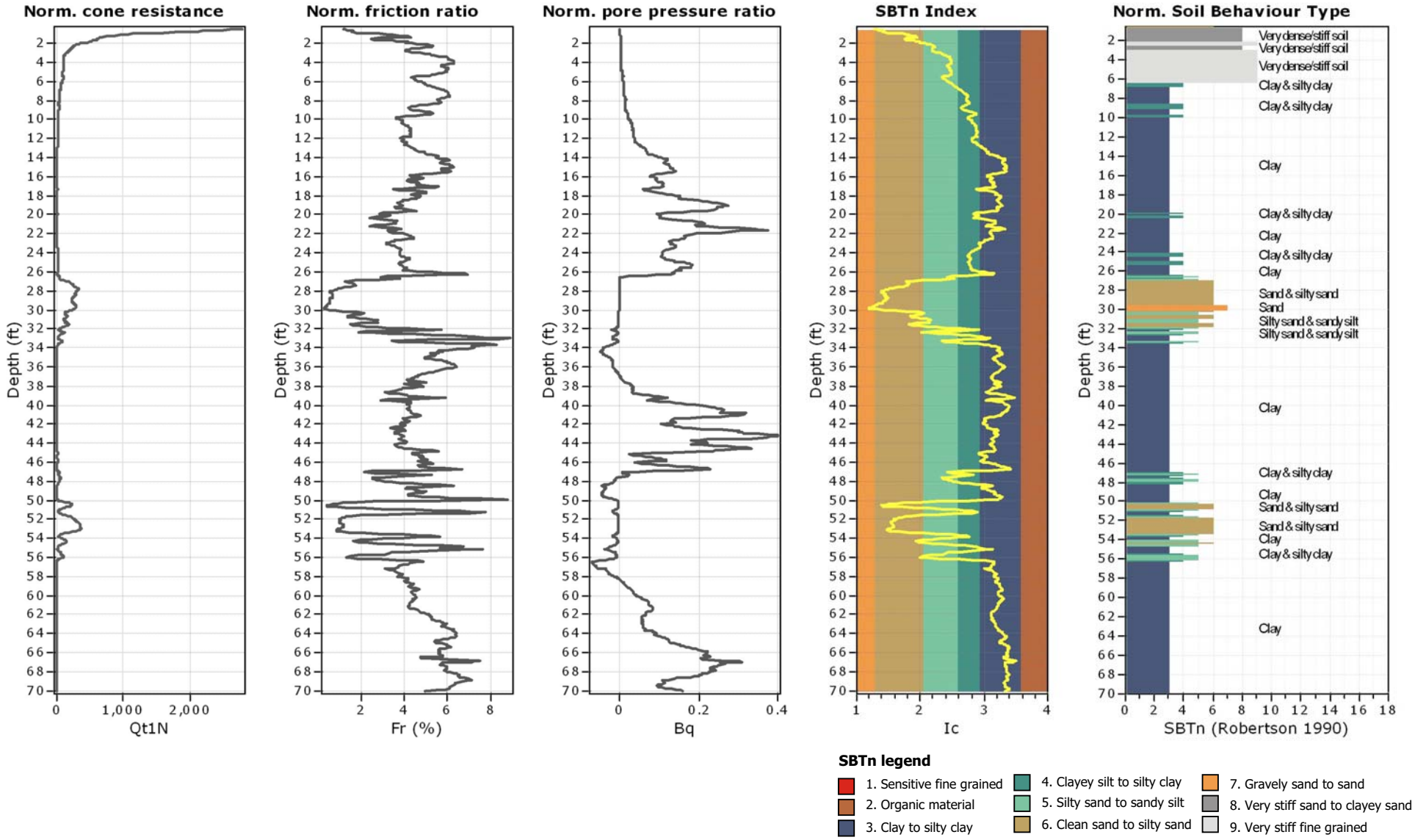
Project: Stevens Creek Levee

CPT: CPT-11 - Total depth: 70.05 (ft)



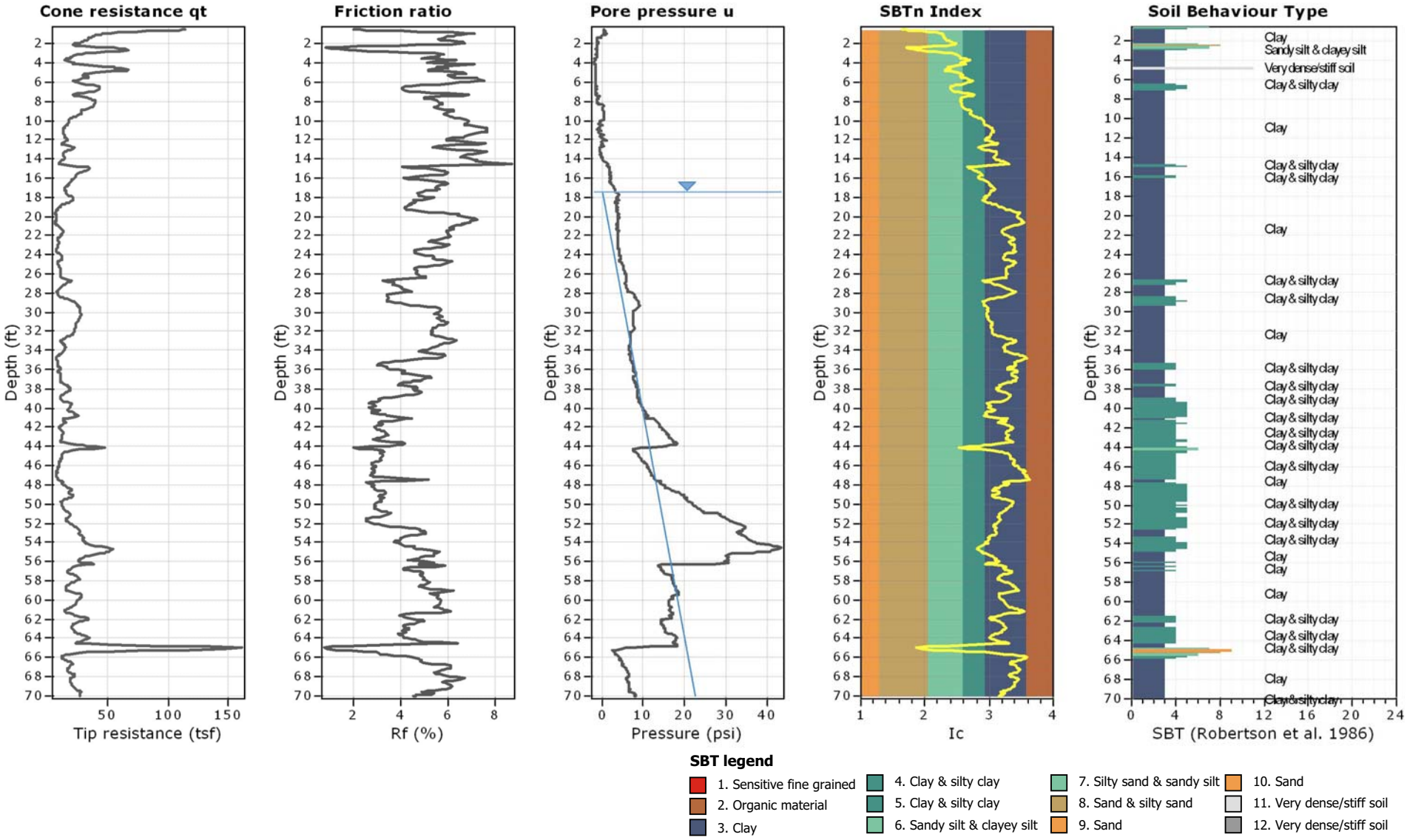
Project: Stevens Creek Levee

CPT: CPT-11 - Total depth: 70.05 (ft)



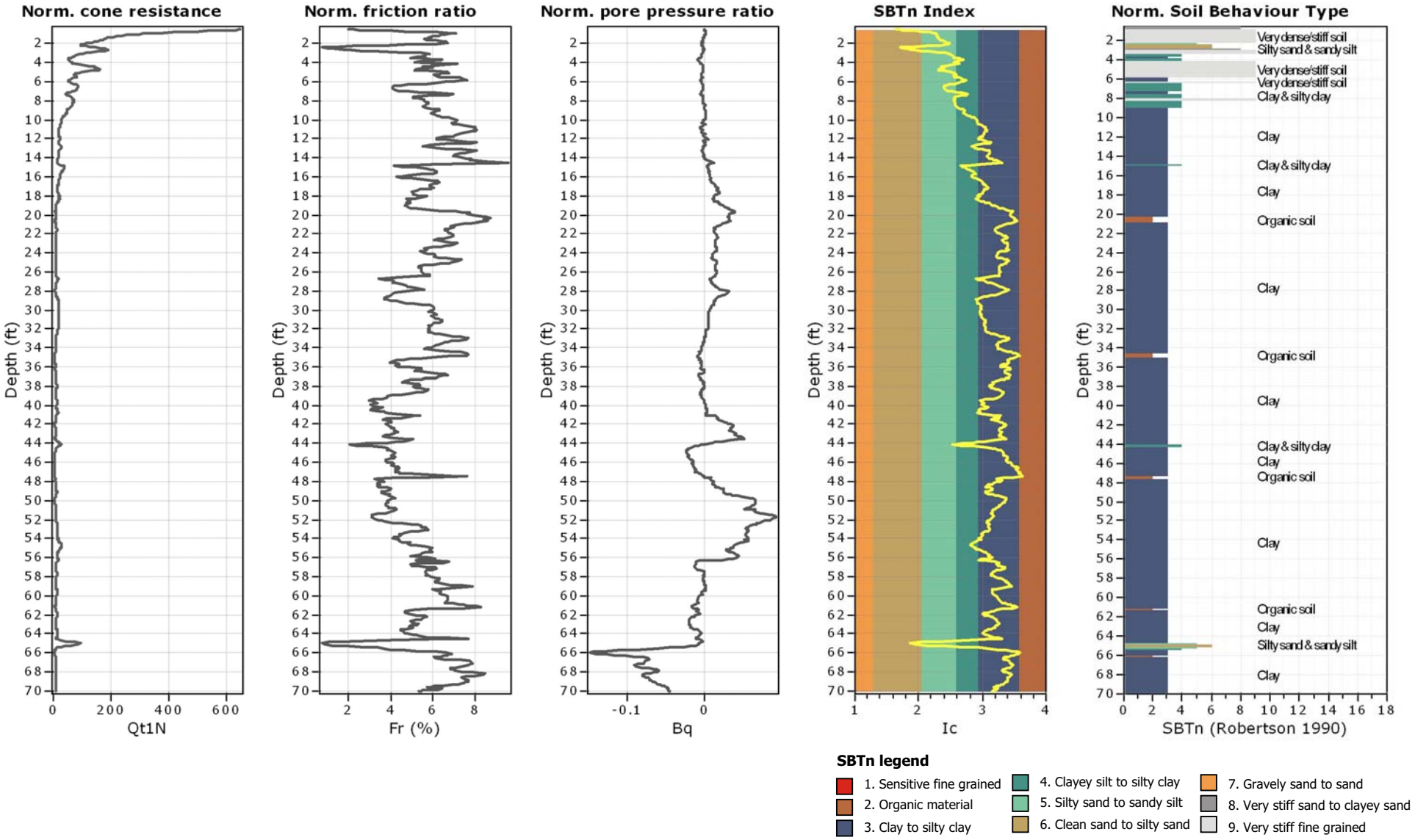
Project: Stevens Creek Levee

CPT: CPT-13 - Total depth: 70.03 (ft)



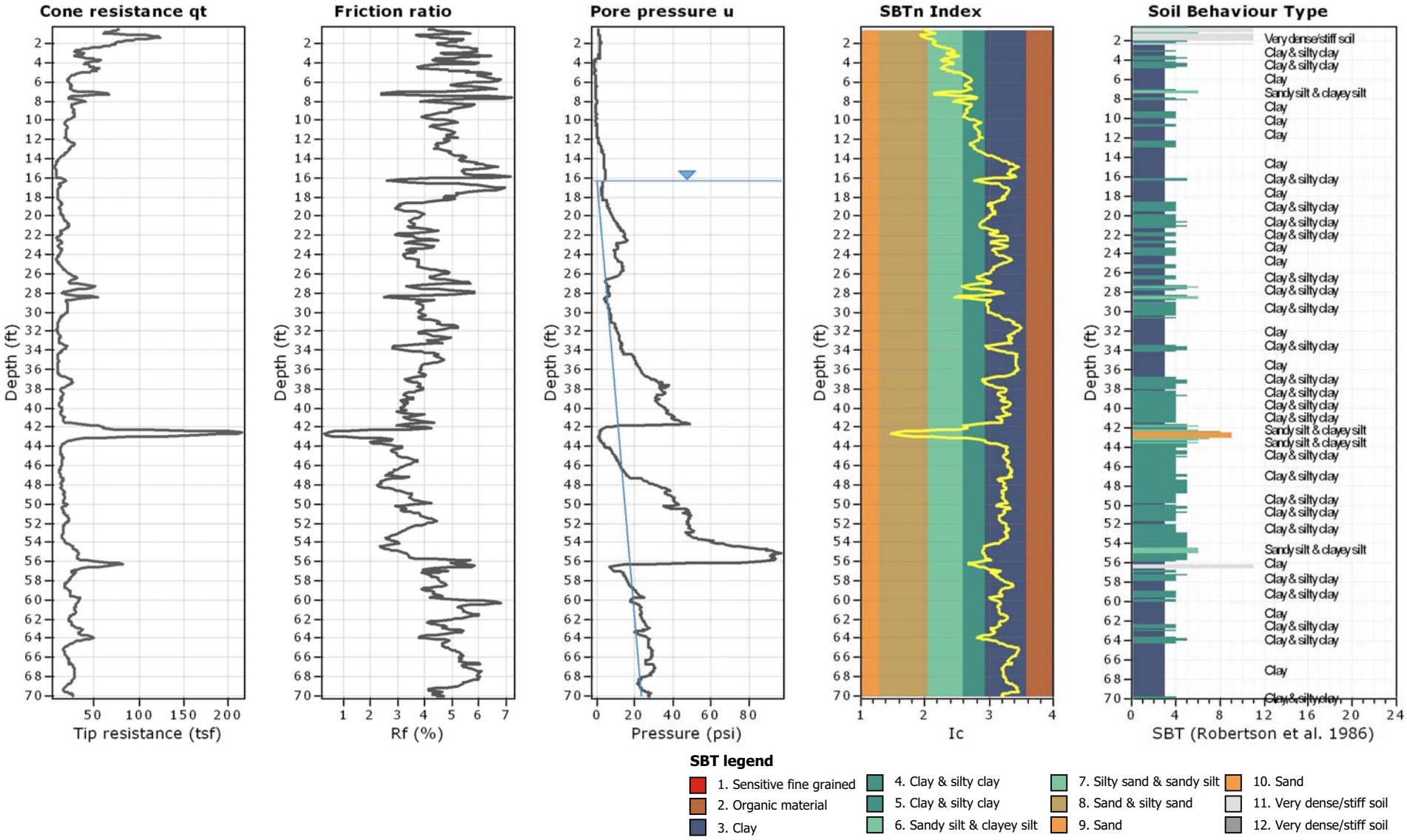
Project: Stevens Creek Levee

CPT: CPT-13 - Total depth: 70.03 (ft)



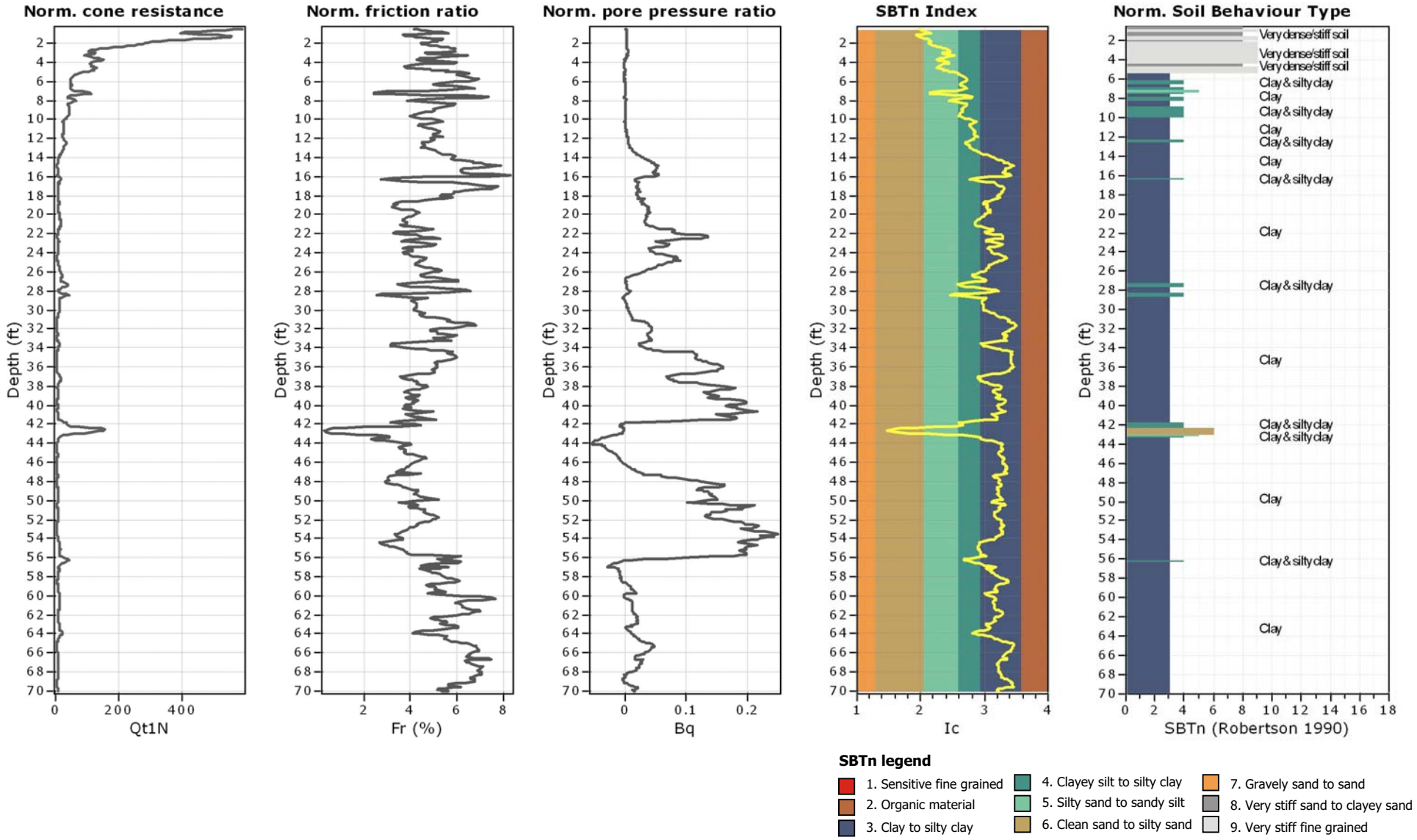
Project: Stevens Creek Levee

CPT: CPT-12 - Total depth: 70.02 (ft)



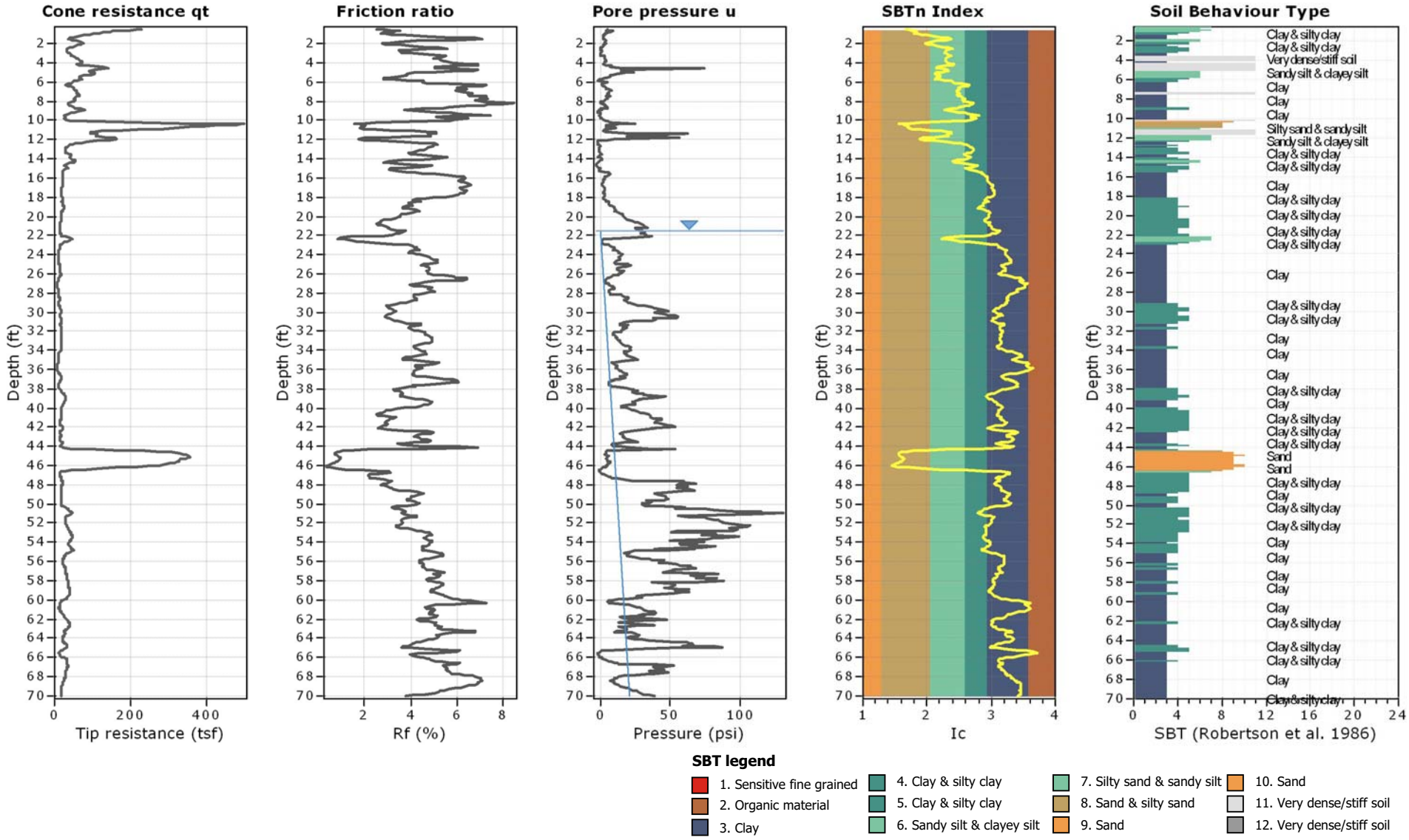
Project: Stevens Creek Levee

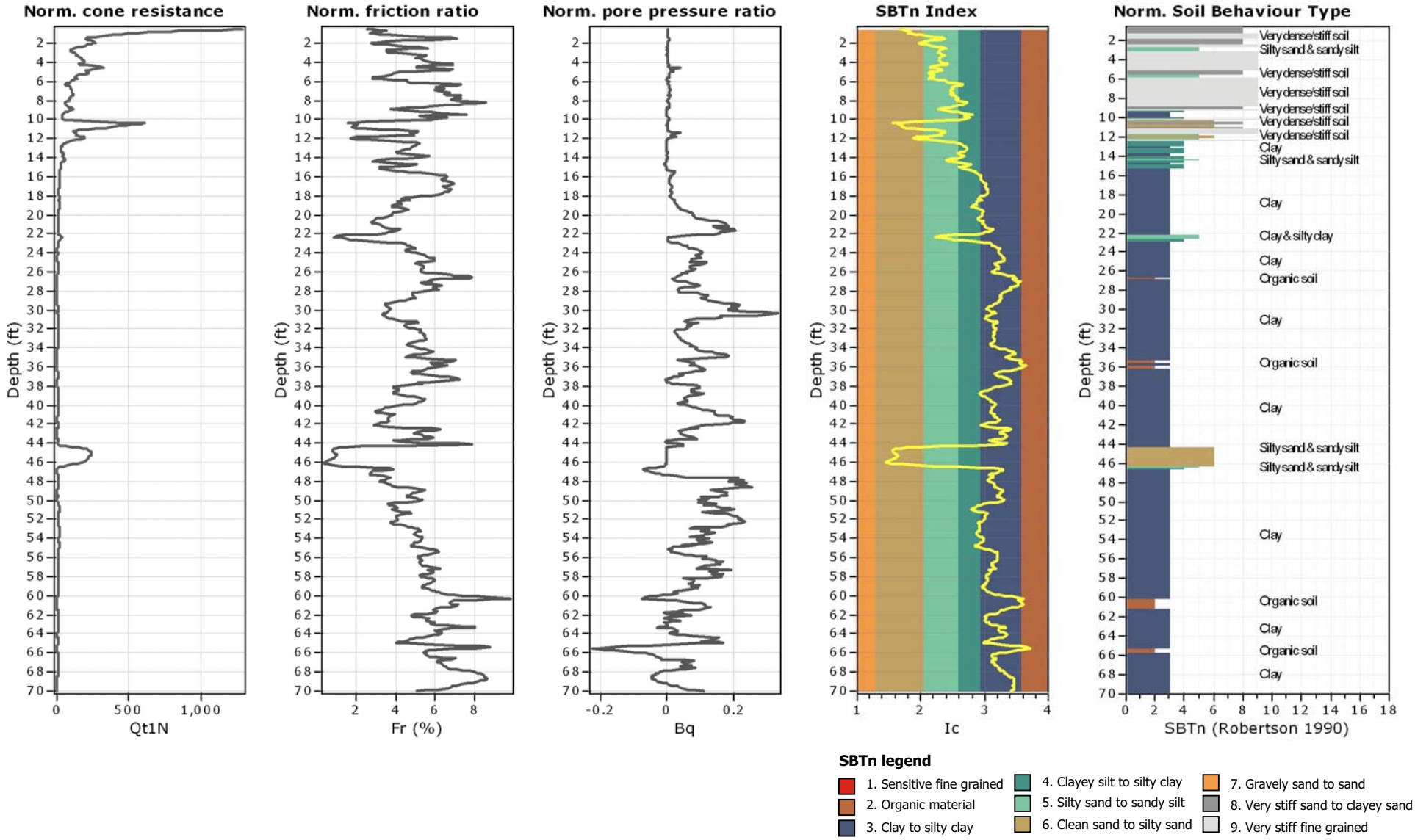
CPT: CPT-12 - Total depth: 70.02 (ft)



Project: Stevens Creek Levee

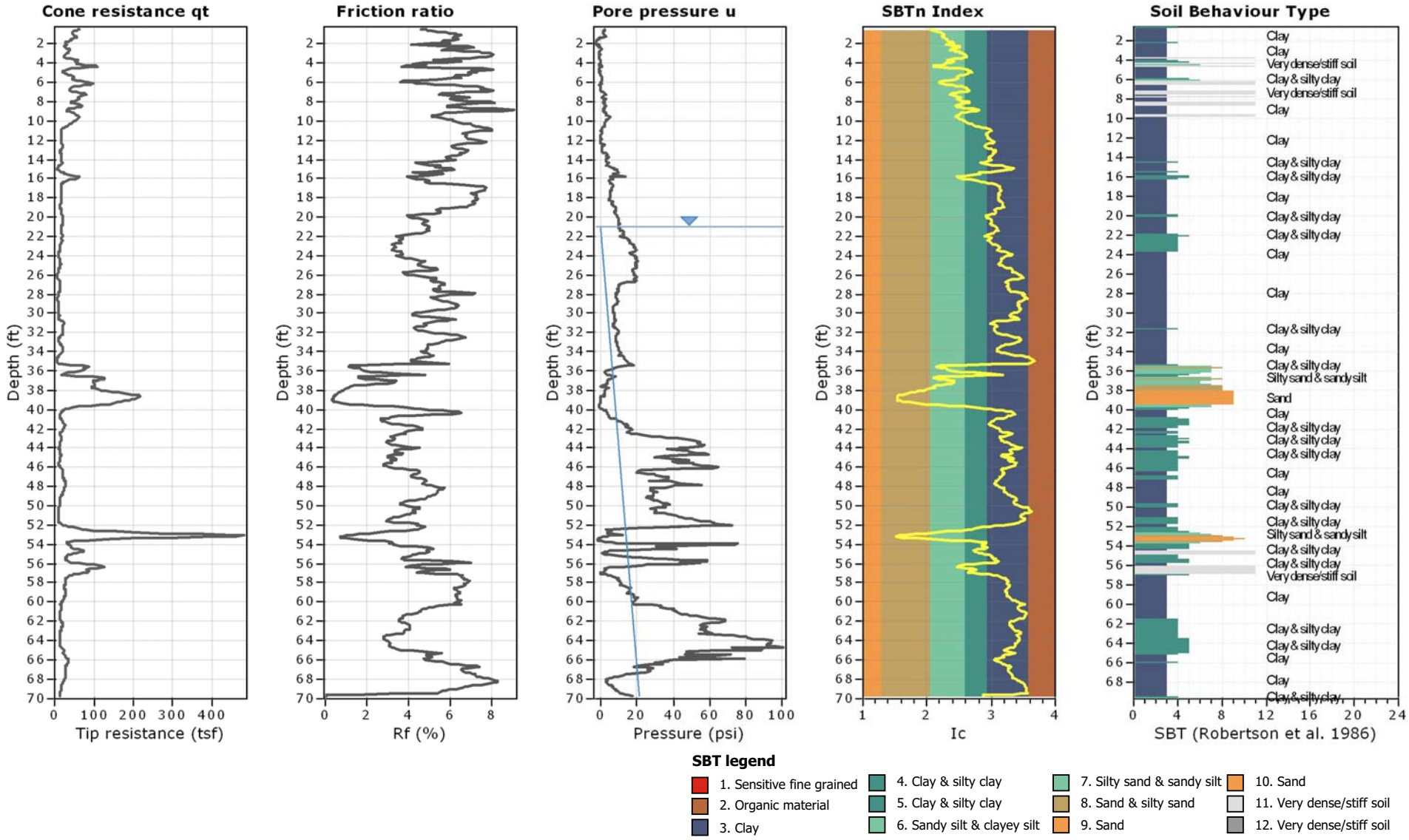
CPT: CPT-14 - Total depth: 70.03 (ft)




Norm. cone resistance
Depth (ft)
Qt1N
Norm. friction ratio
Fr (%)
Norm. pore pressure ratio
Bq
SBTn Index
Ic
Norm. Soil Behaviour Type
SBTn (Robertson 1990)
Very dense/stiff soil
Silty sand & sandy silt
Very dense/stiff soil
Very dense/stiff soil
Very dense/stiff soil
Very dense/stiff soil
Very dense/stiff soil
Clay
Silty sand & sandy silt
Clay
Clay & silty clay
Clay
Organic soil
Clay
Organic soil
Clay
Silty sand & sandy silt
Silty sand & sandy silt
Clay
Organic soil
Clay
Organic soil
Clay
SBTn legend
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

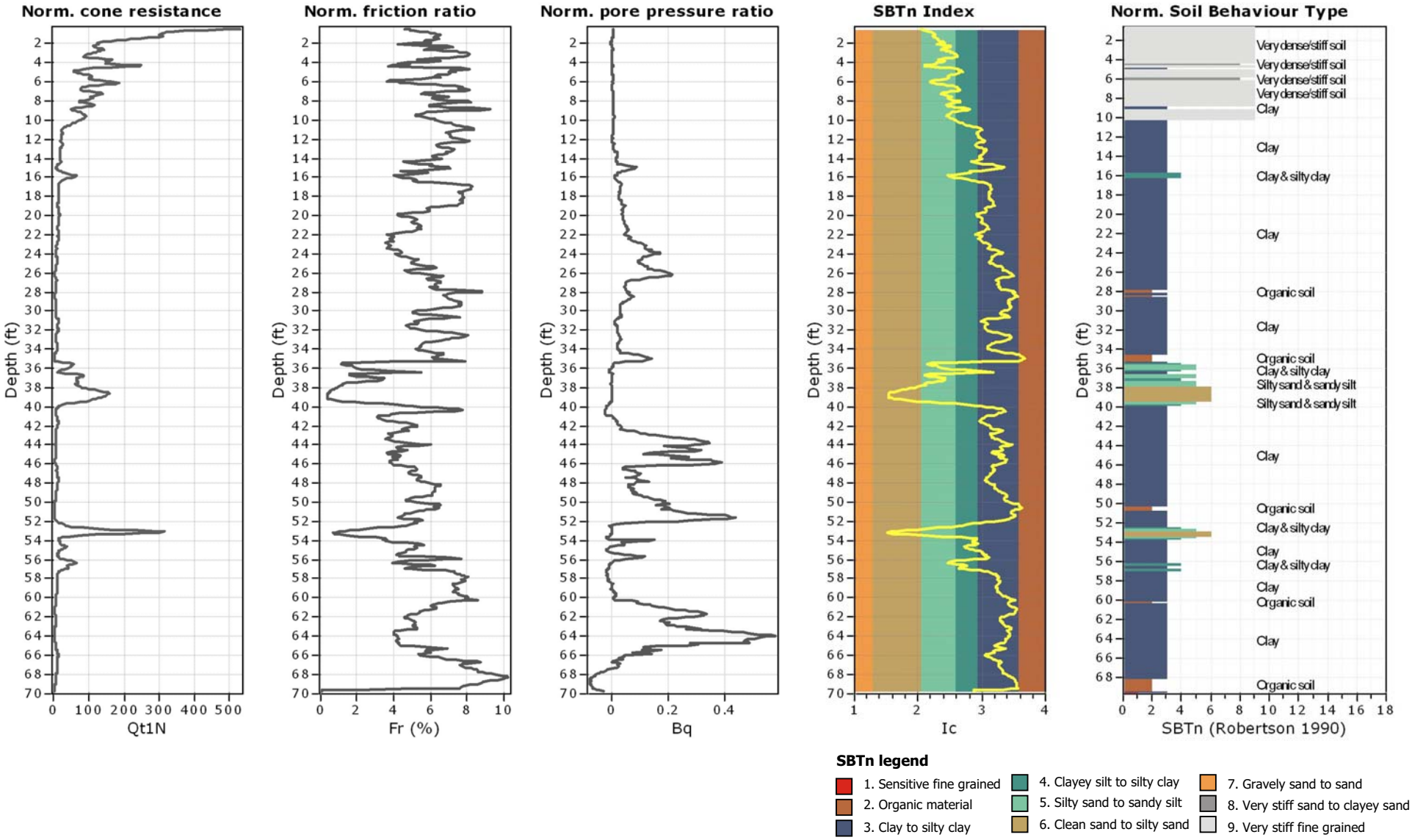
Project: Stevens Creek Levee

CPT: CPT-15 - Total depth: 69.76 (ft)



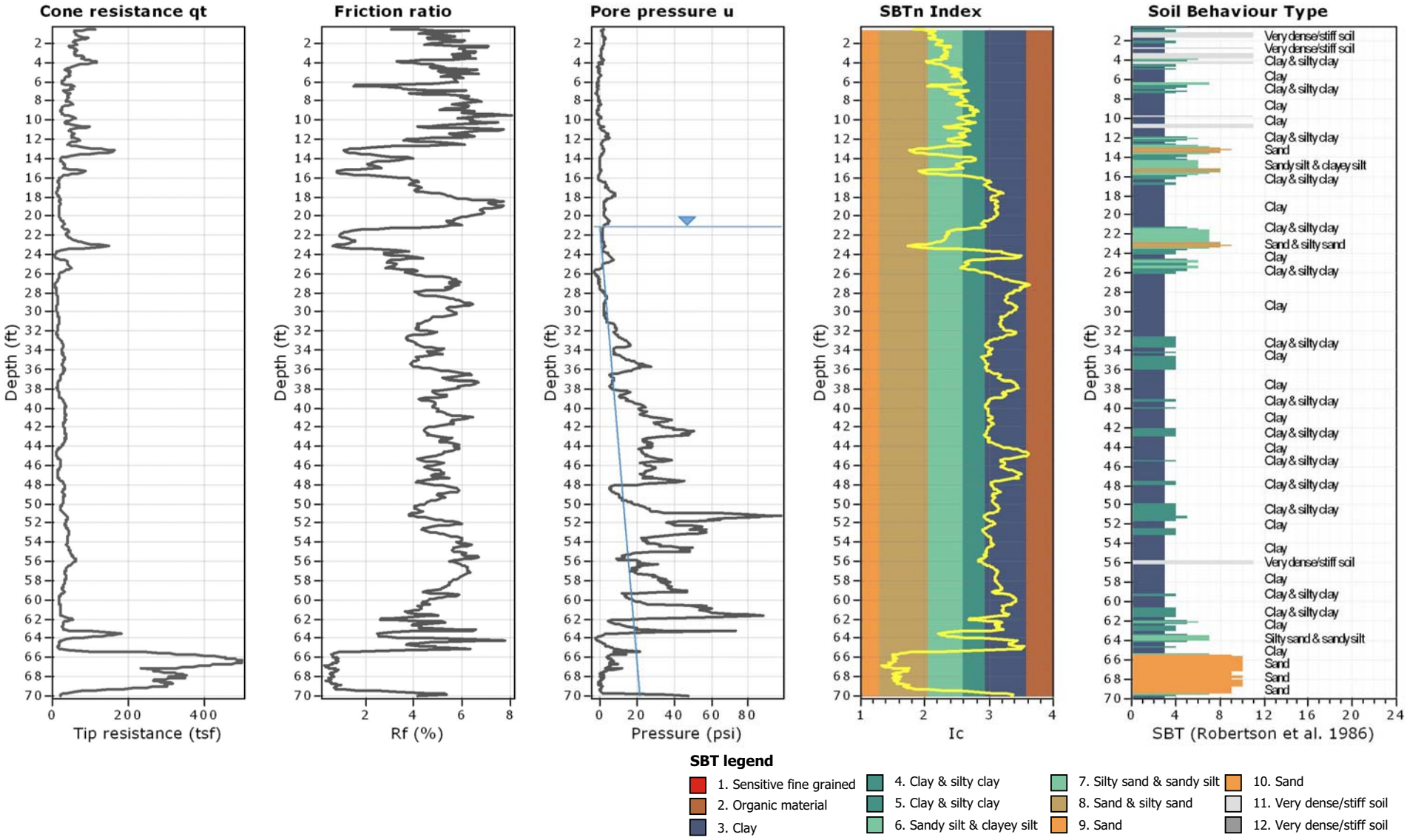
Project: Stevens Creek Levee

CPT: CPT-15 - Total depth: 69.76 (ft)



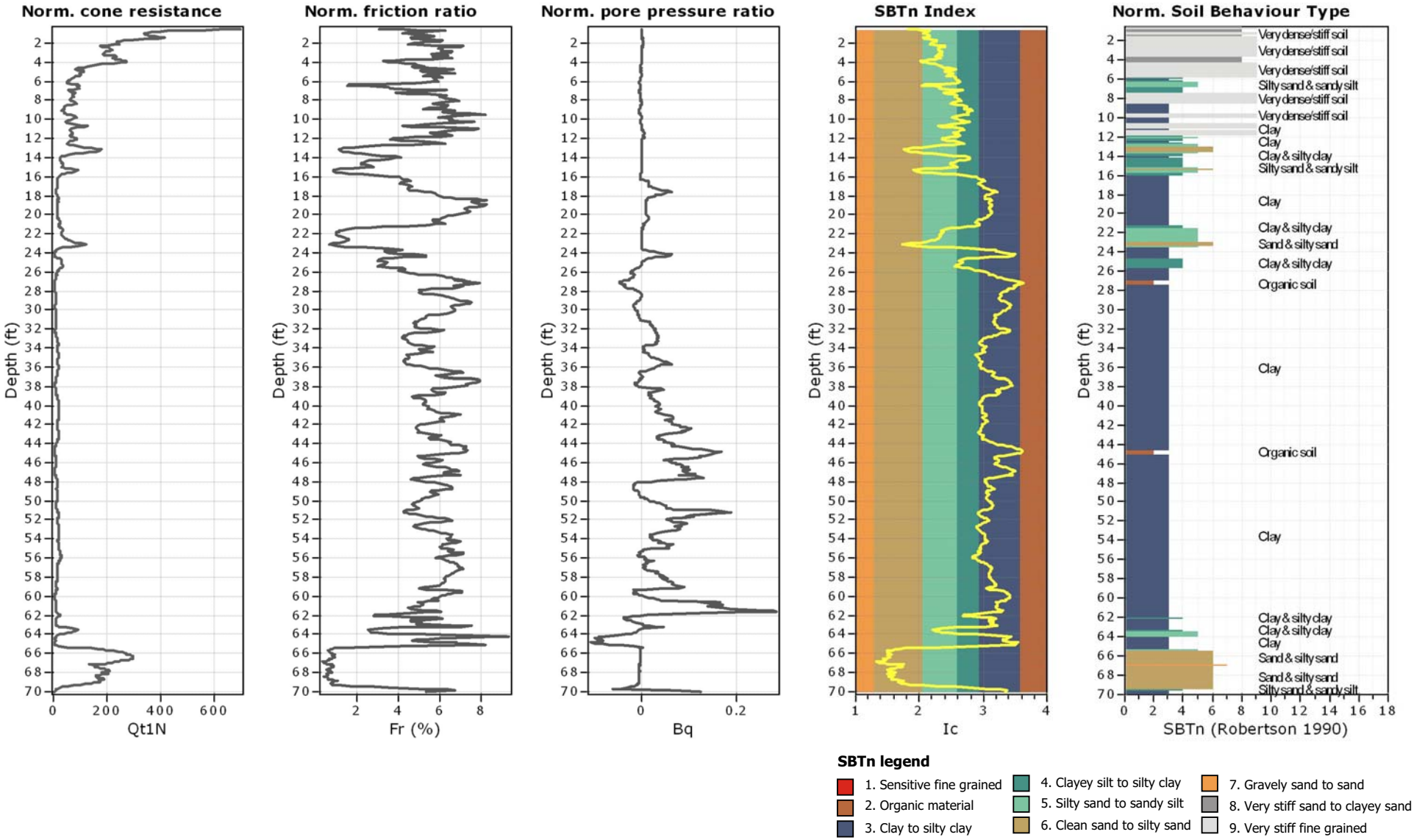
Project: Stevens Creek Levee

CPT: CPT-16 - Total depth: 70.03 (ft)



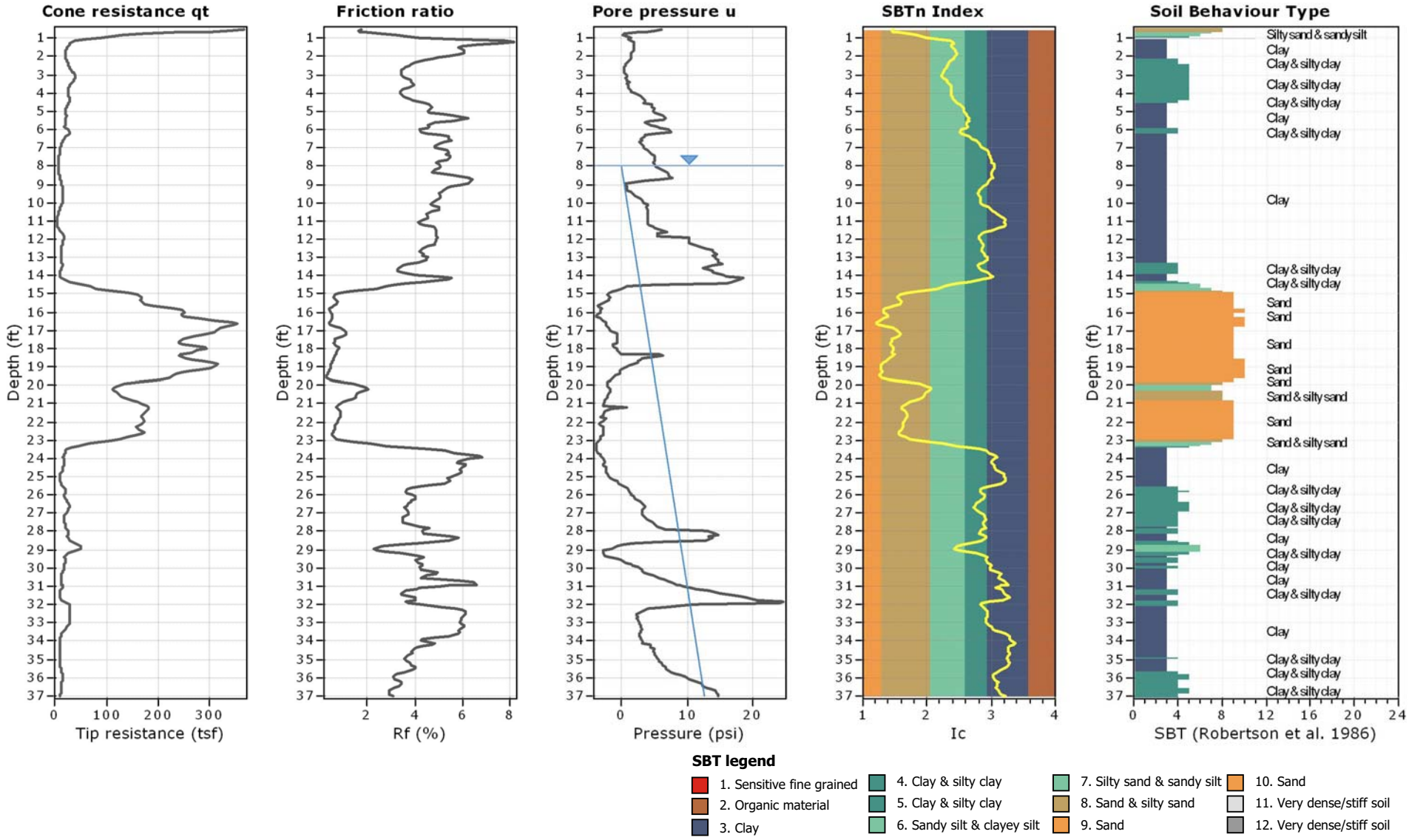
Project: Stevens Creek Levee

CPT: CPT-16 - Total depth: 70.03 (ft)



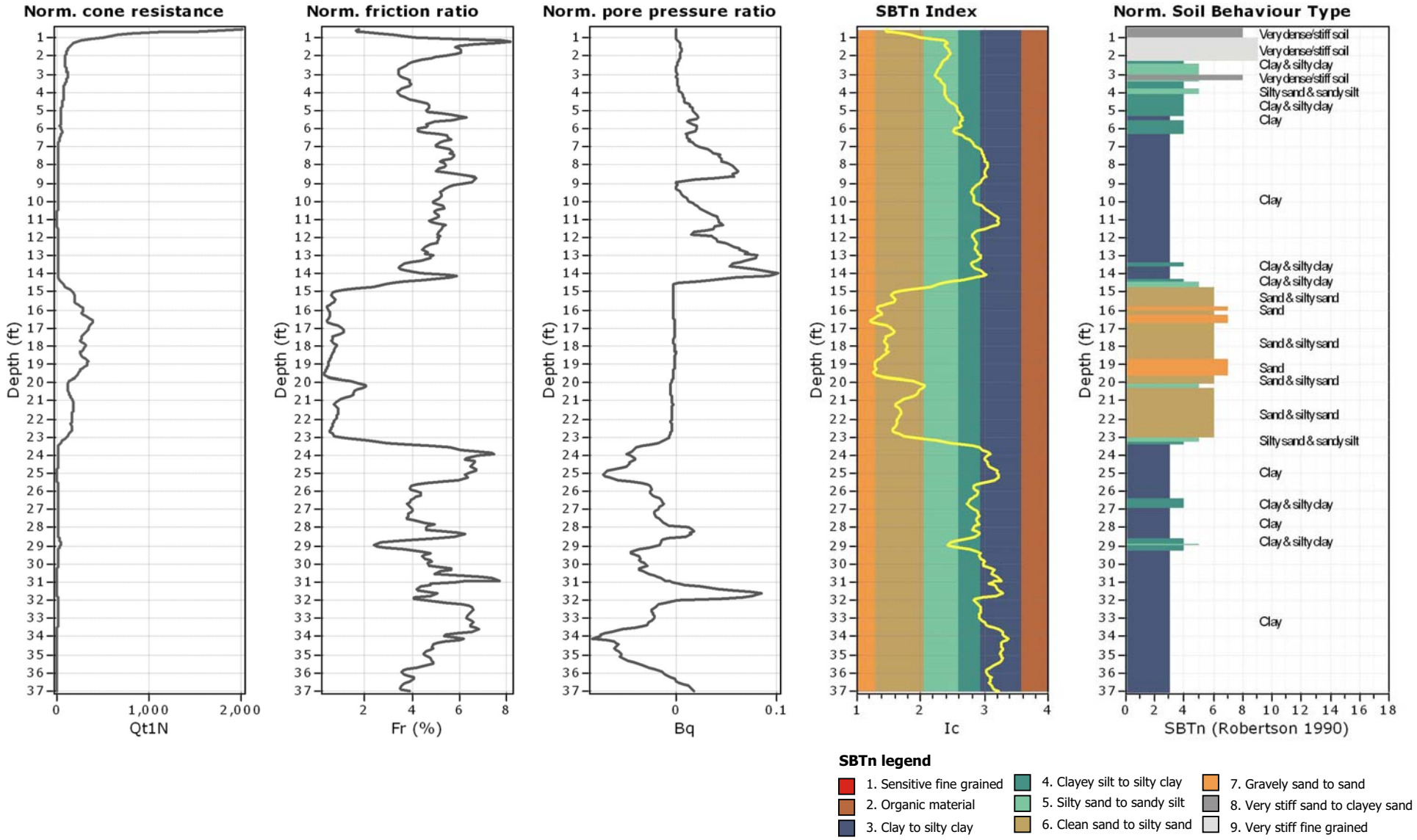
Project: Stevens Creek Levee

CPT: CPT-17 - Total depth: 37.01 (ft)



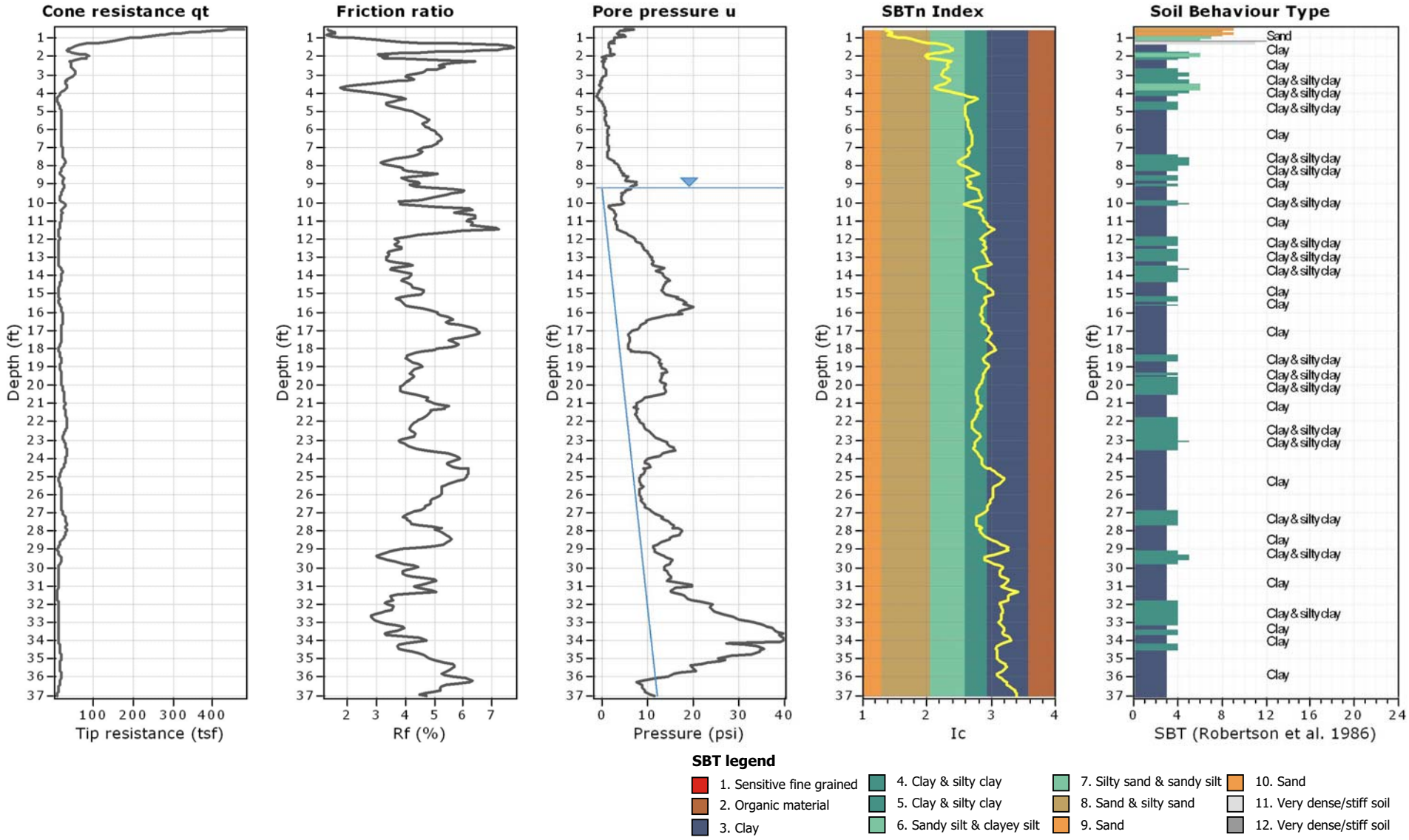
Project: Stevens Creek Levee

CPT: CPT-17 - Total depth: 37.01 (ft)



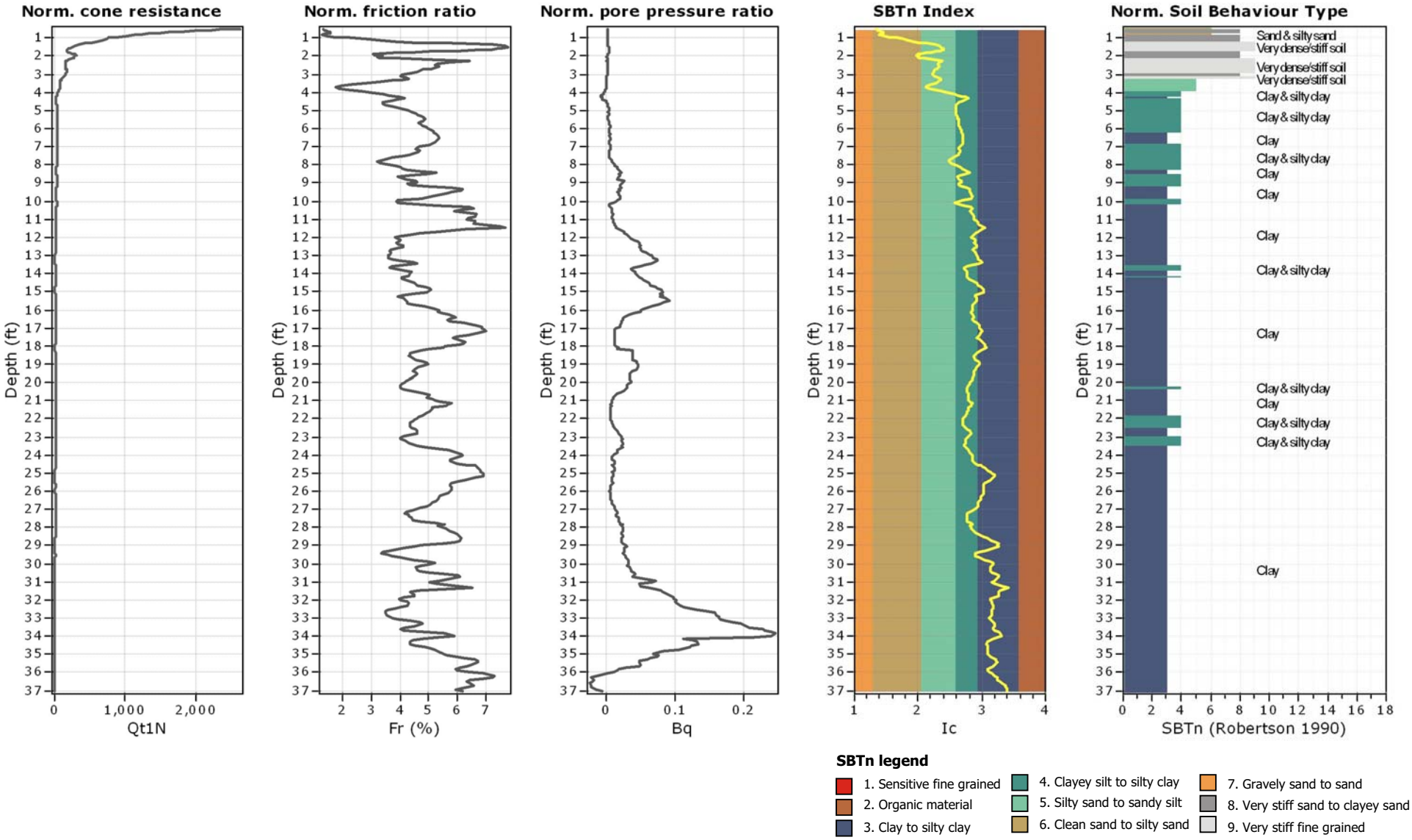
Project: Stevens Creek Levee

CPT: CPT-18 - Total depth: 37.03 (ft)



Project: Stevens Creek Levee

CPT: CPT-18 - Total depth: 37.03 (ft)



CPeT-IT v.1.6.0.68 - CPTU data presentation & interpretation software - Report created on: 5/1/2009, 9:59:13 AM

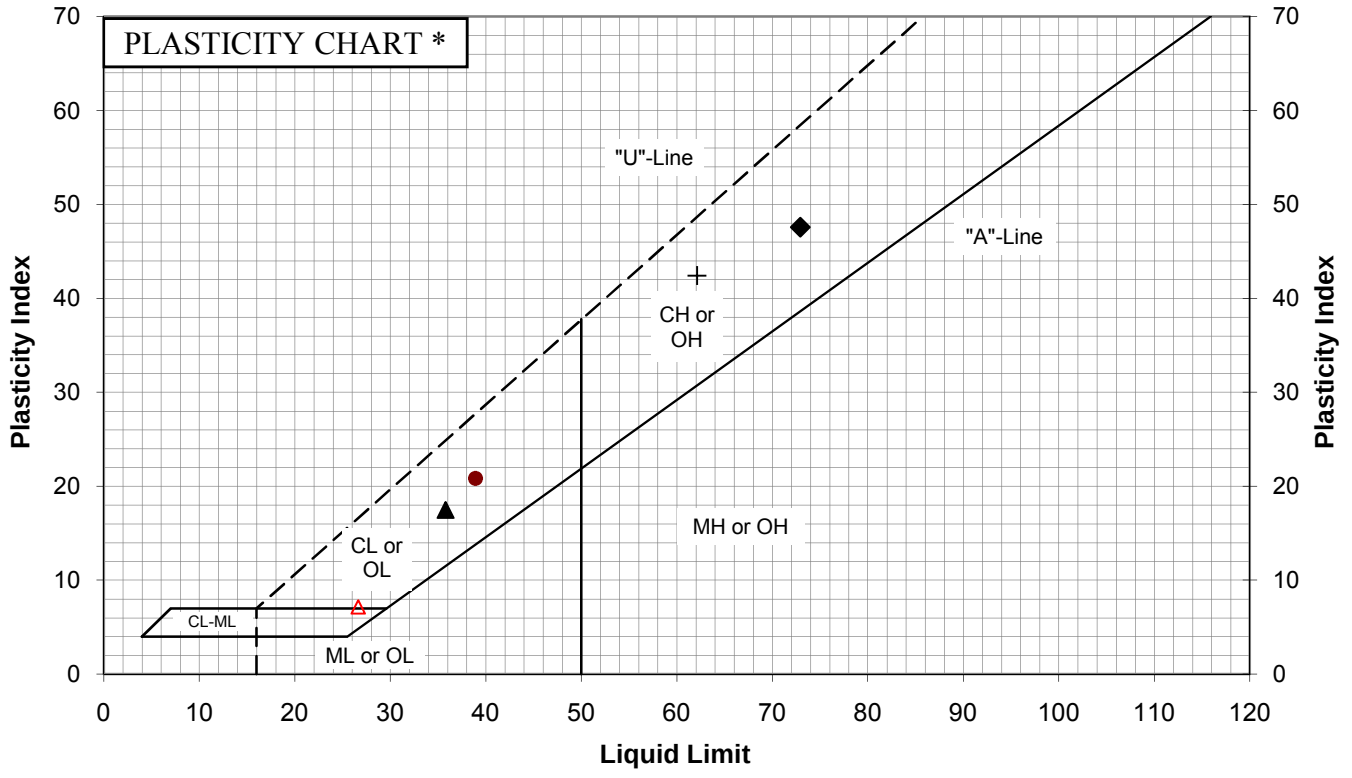
Project file: I:\Project\13000\13815.002\5000 INVESTIGATION, Recon, Field, Lab\CPTs\Stevens_Creek_CPTs.cpt

APPENDIX D

Laboratory Test Results

ATTERBERG LIMITS TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification			PROJECT No.	2227 E
DATE OF TEST	11/4/2008	11/5/2008	11/5/2008	11/5/2008	11/4/2008
KEY SYMBOL	♦	▲	●	+	Δ
DRILL HOLE No.	B1	B1	B1	B2	B2
DEPTH (ft)	9	19.5-20	29	5.5	33.5-34.5
NATURAL WATER CONTENT (%)	25	23	23	27	21
% Retained No. 40 SIEVE (Est.)	0	10	0	0	15
% PASSING No. 200 SIEVE	NA	72	NA	NA	NA
LIQUID LIMIT	73	36	39	62	27
PLASTIC LIMIT	25	18	18	20	19
PLASTICITY INDEX	48	17	21	42	7
CLASSIFICATION SYMBOL	CH	CL	CL	CH	CL-ML



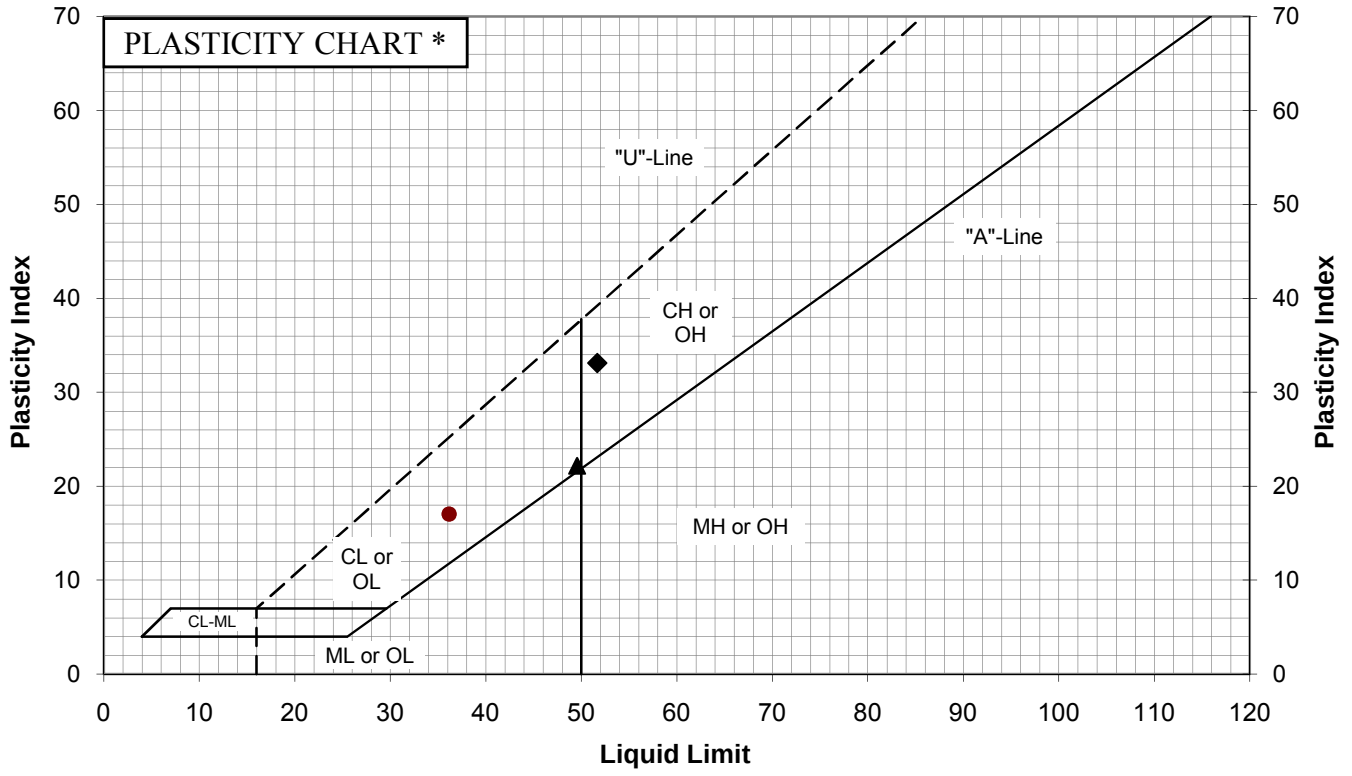
PACIFIC GEOTECHNICAL ENGINEERING

Figure C-1

Rev030106

ATTERBERG LIMITS TEST RESULTS

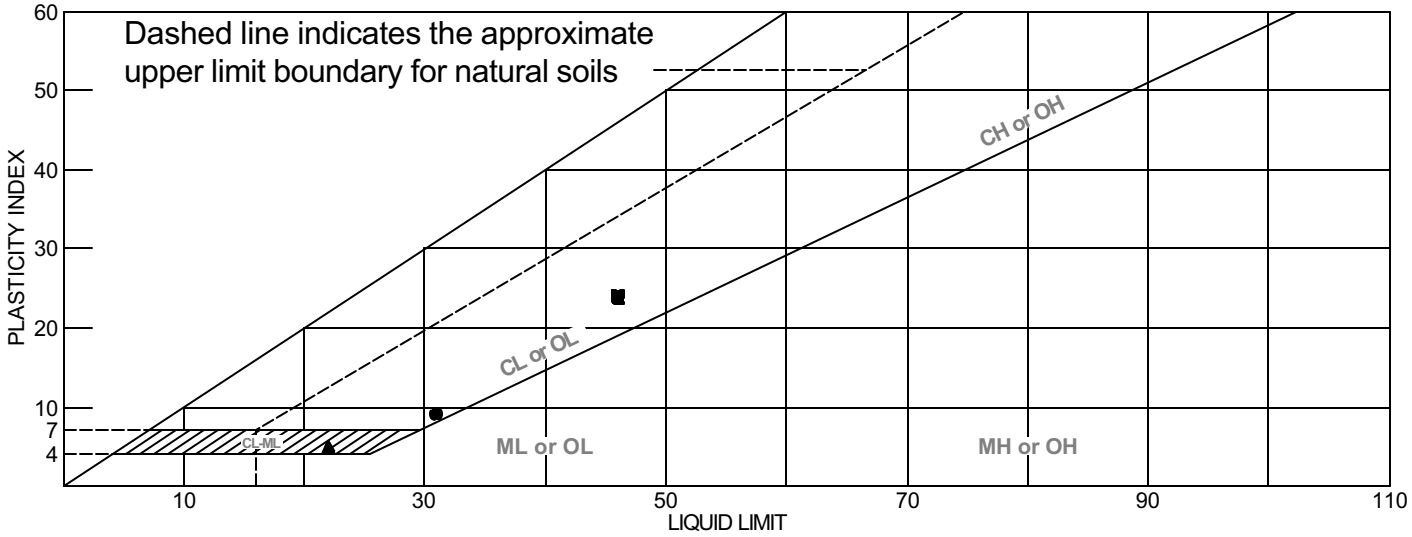
PROJECT NAME	**SCVWD Stevens Creek Levees Recertification**			PROJECT No.	2227 E
DATE OF TEST	11/5/2008	11/4/2008	11/4/2008		
KEY SYMBOL	♦	▲	●		
DRILL HOLE No.	B2	B3	B4		
DEPTH (ft)	64	15.5	31		
NATURAL WATER CONTENT (%)	27	38	21		
% Retained No. 40 SIEVE (Est.)	0	20	25		
% PASSING No. 200 SIEVE	NA	NA	NA		
LIQUID LIMIT	52	50	36		
PLASTIC LIMIT	19	27	19		
PLASTICITY INDEX	33	22	17		
CLASSIFICATION SYMBOL	CH	CH	CL		

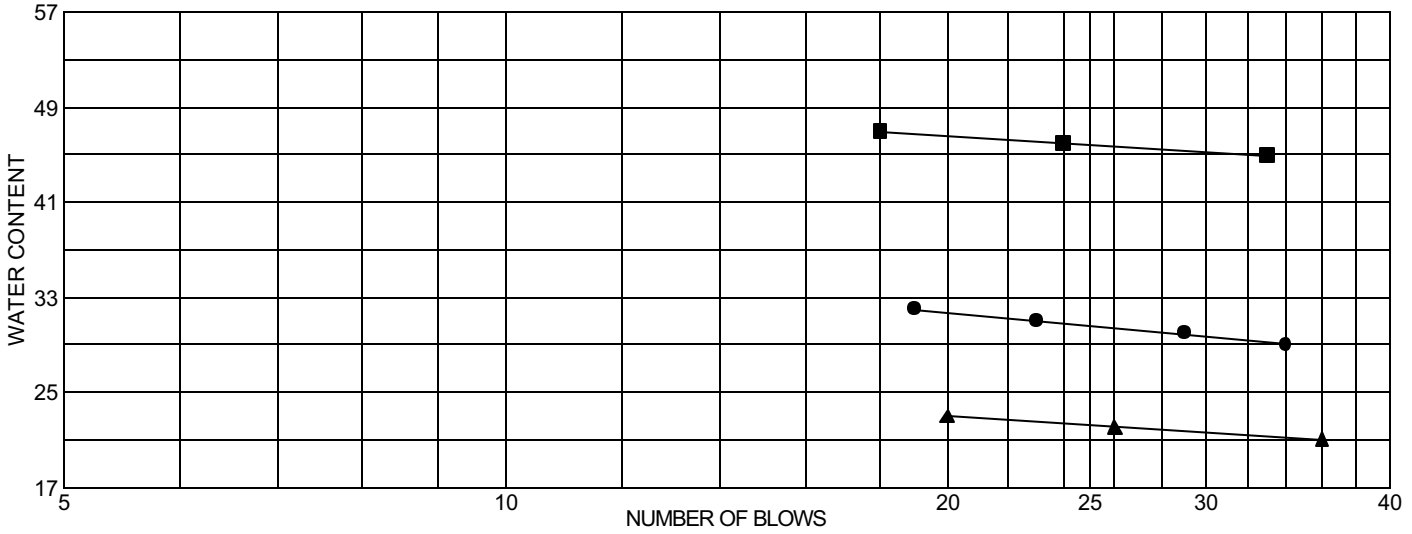


PACIFIC GEOTECHNICAL ENGINEERING **Figure C-2**

Rev030106

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Lean CLAY w/ Sand	31	22	9			
■	Grayish Brown Sandy Lean CLAY	46	22	24			
▲	Olive Silty, Clayey SAND	22	17	5	81.4	44.2	SC-SM

Project No. 226-173 **Client:** Pacific Geotechnical Engineering

Project: Stevens Creek Levees Recertification - 2227E

● **Source:** B-2 **Elev./Depth:** 25-27.5'

■ **Source:** B-2 **Elev./Depth:** 45-46'

▲ **Source:** B-4 **Elev./Depth:** 12-13'

Remarks:

●

■

▲

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

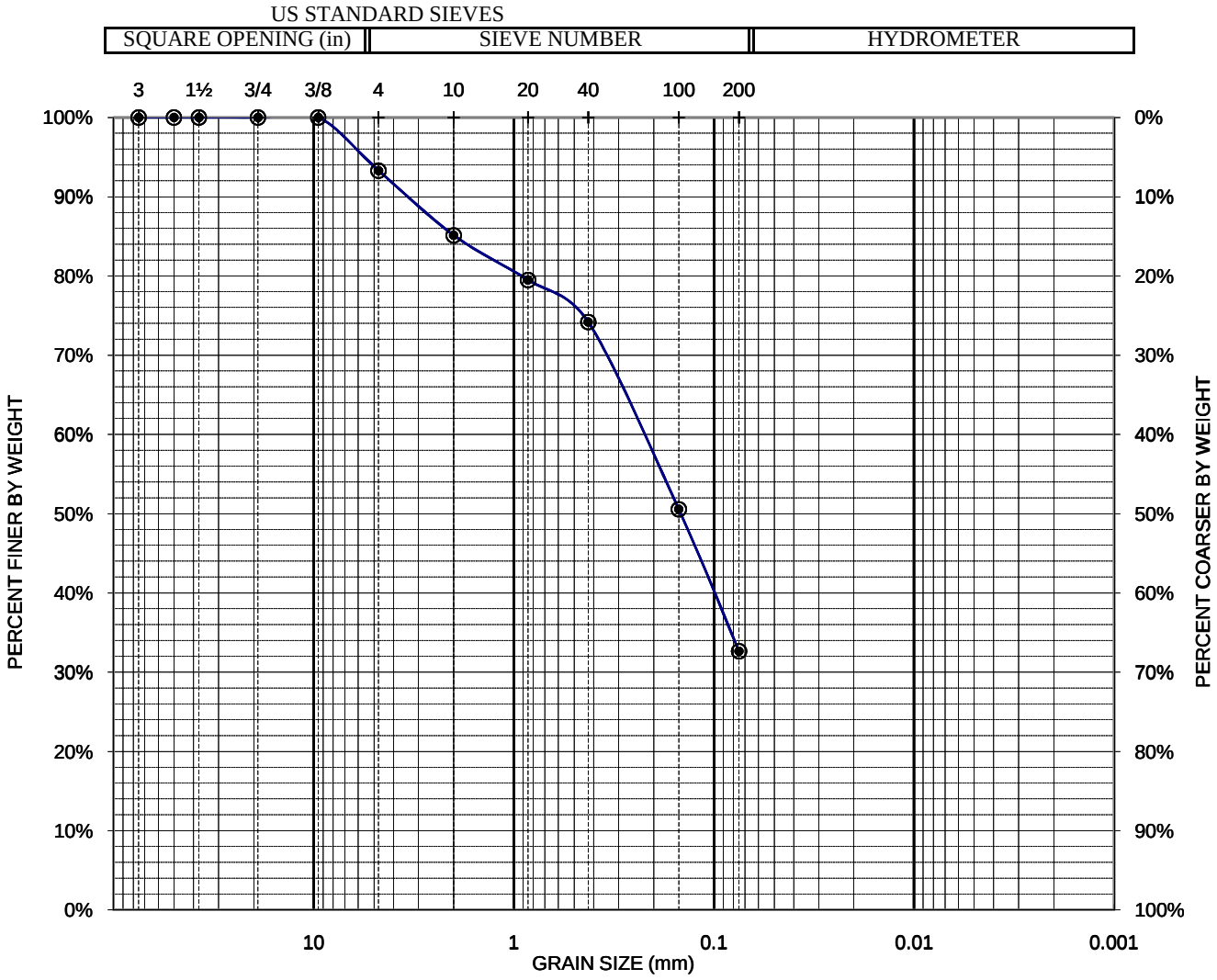
Figure C-3

GRAIN SIZE TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification			**PROJECT No.**	2227 E
DRILL HOLE No.	B-1	**DEPTH (ft)**	25 - 26	**SAMPLE** NA	**DATE OF TEST** 11/3/2008

SOURCE/QUARRY:

DESCRIPTION OF SOIL: CLAYEY SAND (SC): Greenish gray (Gley 1 3/1), moist



	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES	GRAVEL		SAND			SILT & CLAY
	6.7%		60.6%			32.7%

REMARKS:

PACIFIC GEOTECHNICAL ENGINEERING | **Figure** C-4

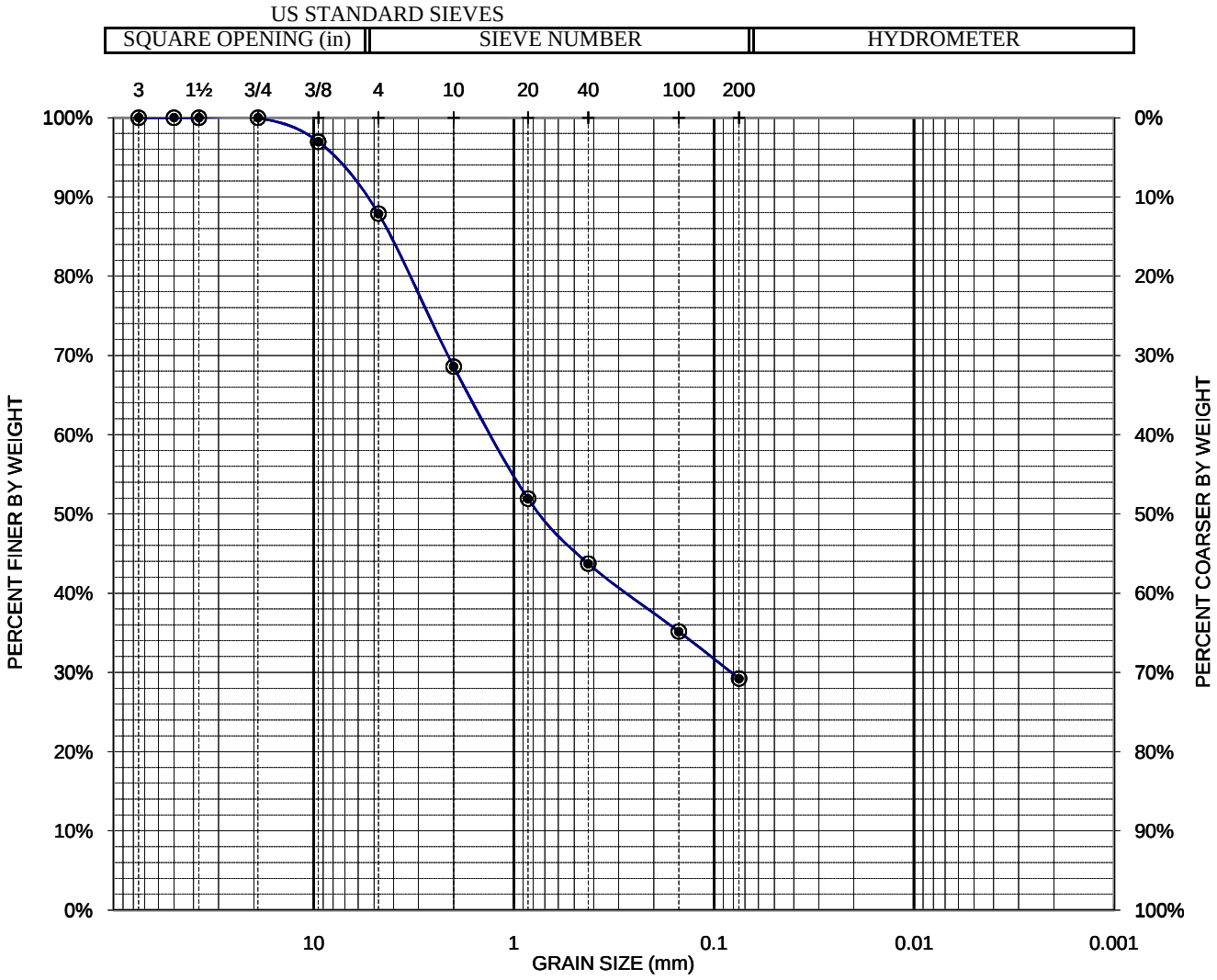
RevOct20070

GRAIN SIZE TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification					**PROJECT No.**	2227 E
DRILL HOLE No.	B-2	**DEPTH (ft)**	19	**SAMPLE**	NA	**DATE OF TEST**	11/4/2008

SOURCE/QUARRY:

DESCRIPTION OF SOIL: CLAYEY SAND (SC): Dark grayish brown (10YR 4/2), moist to wet



	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES	GRAVEL		SAND			SILT & CLAY
	12.1%		58.7%			29.2%

REMARKS:

PACIFIC GEOTECHNICAL ENGINEERING | **Figure C-5**

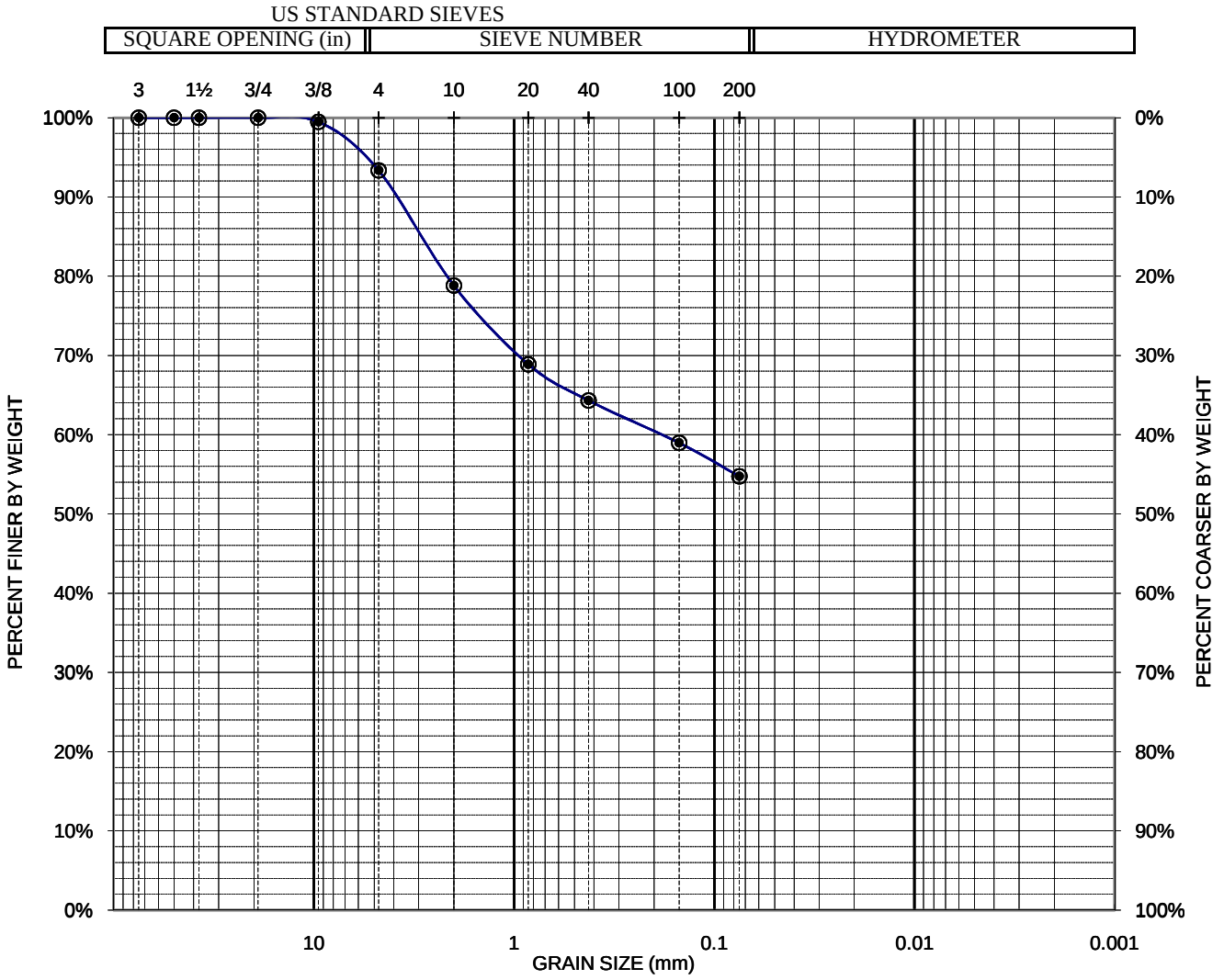
RevOct20070

GRAIN SIZE TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification					**PROJECT No.**	2227 E
DRILL HOLE No.	B-2	**DEPTH (ft)**	22½	**SAMPLE**	NA	**DATE OF TEST**	11/4/2008

SOURCE/QUARRY: on site

DESCRIPTION OF SOIL: SANDY LEAN CLAY (CL): Grayish brown (2.5Y 5/2), wet



	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES	GRAVEL		SAND			SILT & CLAY
	6.7%		38.6%			54.8%

REMARKS:

PACIFIC GEOTECHNICAL ENGINEERING | **Figure C-6**

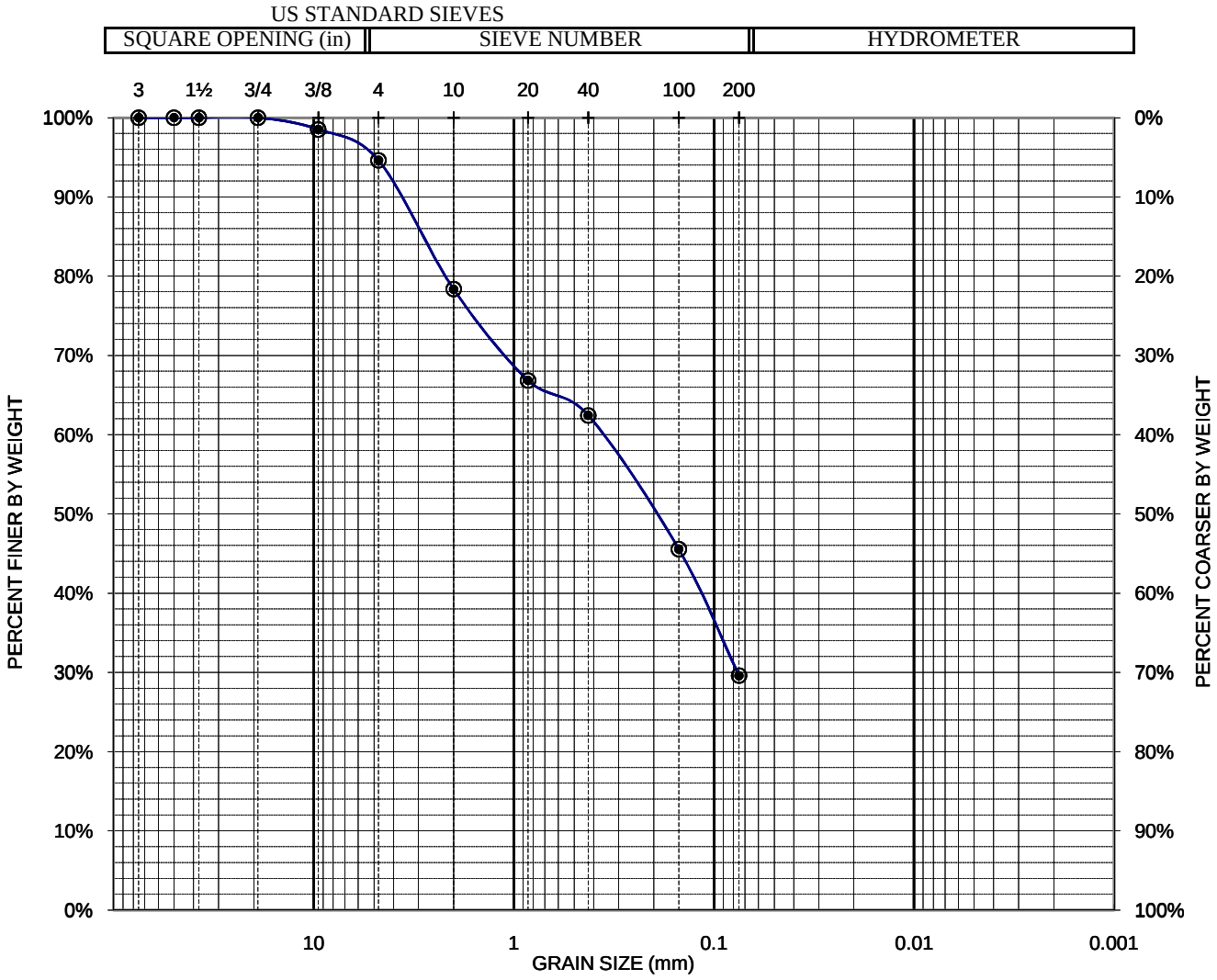
RevOct20070

GRAIN SIZE TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification					**PROJECT No.**	2227 E
DRILL HOLE No.	B-2	**DEPTH (ft)**	29½	**SAMPLE**	NA	**DATE OF TEST**	11/4/2008

SOURCE/QUARRY:

DESCRIPTION OF SOIL: CLAYEY SAND (SC): Grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/4), moist to wet



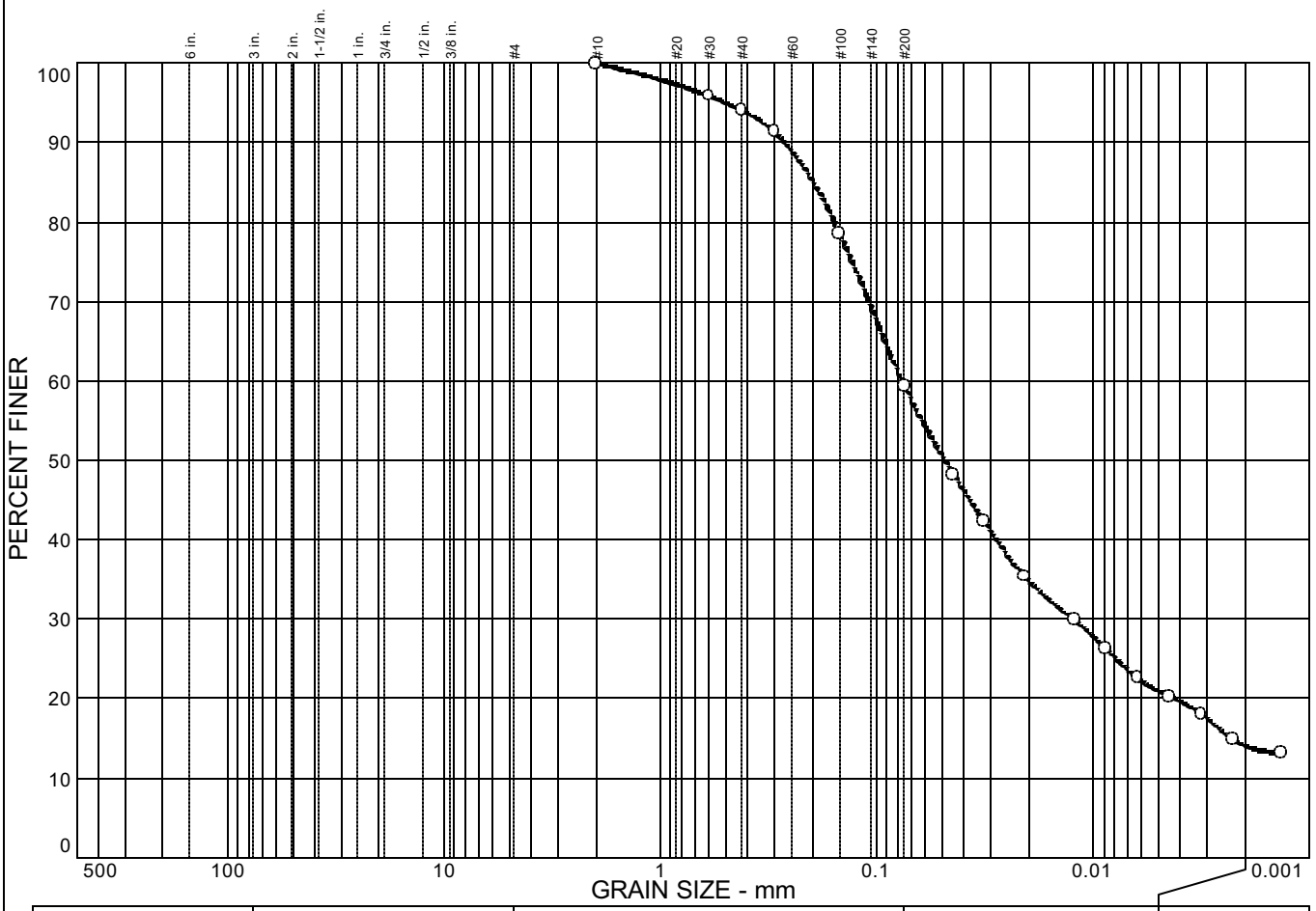
	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES	GRAVEL		SAND			SILT & CLAY
	5.4%		65.0%			29.6%

REMARKS:

PACIFIC GEOTECHNICAL ENGINEERING | **Figure** **C-7**

RevOct20070

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	40.7	45.2	14.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	95.9		
#40	94.1		
#50	91.4		
#100	78.6		
#200	59.3		
0.0445 mm.	48.2		
0.0322 mm.	42.3		
0.0209 mm.	35.4		
0.0123 mm.	29.9		
0.0088 mm.	26.3		
0.0063 mm.	22.6		
0.0045 mm.	20.3		
0.0032 mm.	18.1		
0.0023 mm.	14.9		
0.0014 mm.	13.1		

* (no specification provided)

Soil Description

Olive Sandy CLAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.198 D_{60}= 0.0771 D_{50}= 0.0489
D_{30}= 0.0124 D_{15}= 0.0023 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample No.: **Source of Sample:** B-2 **Date:**
Location: **Elev./Depth:** 33.5-34.5'

COOPER TESTING LABORATORY

Client: Pacific Geotechnical Engineering
Project: Stevens Creek Levees Recertification - 2227E

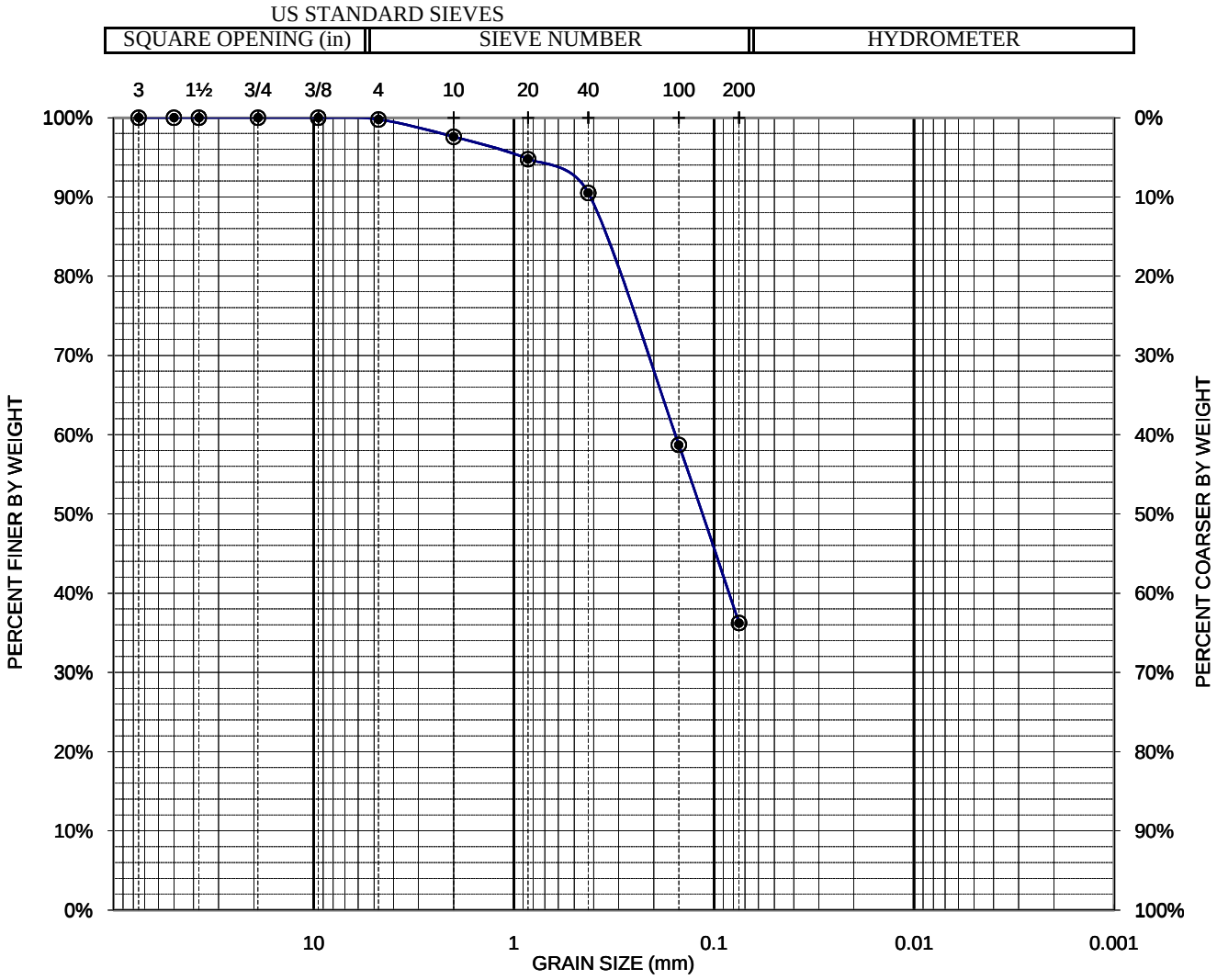
Project No: 226-173 **Figure** C-8

GRAIN SIZE TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification					**PROJECT No.**	2227 E
DRILL HOLE No.	B-3	**DEPTH (ft)**	31	**SAMPLE**	NA	**DATE OF TEST**	11/3/2008

SOURCE/QUARRY:

DESCRIPTION OF SOIL: CLAYEY SAND (SC): Olive brown (2.5YR 4/3), moist



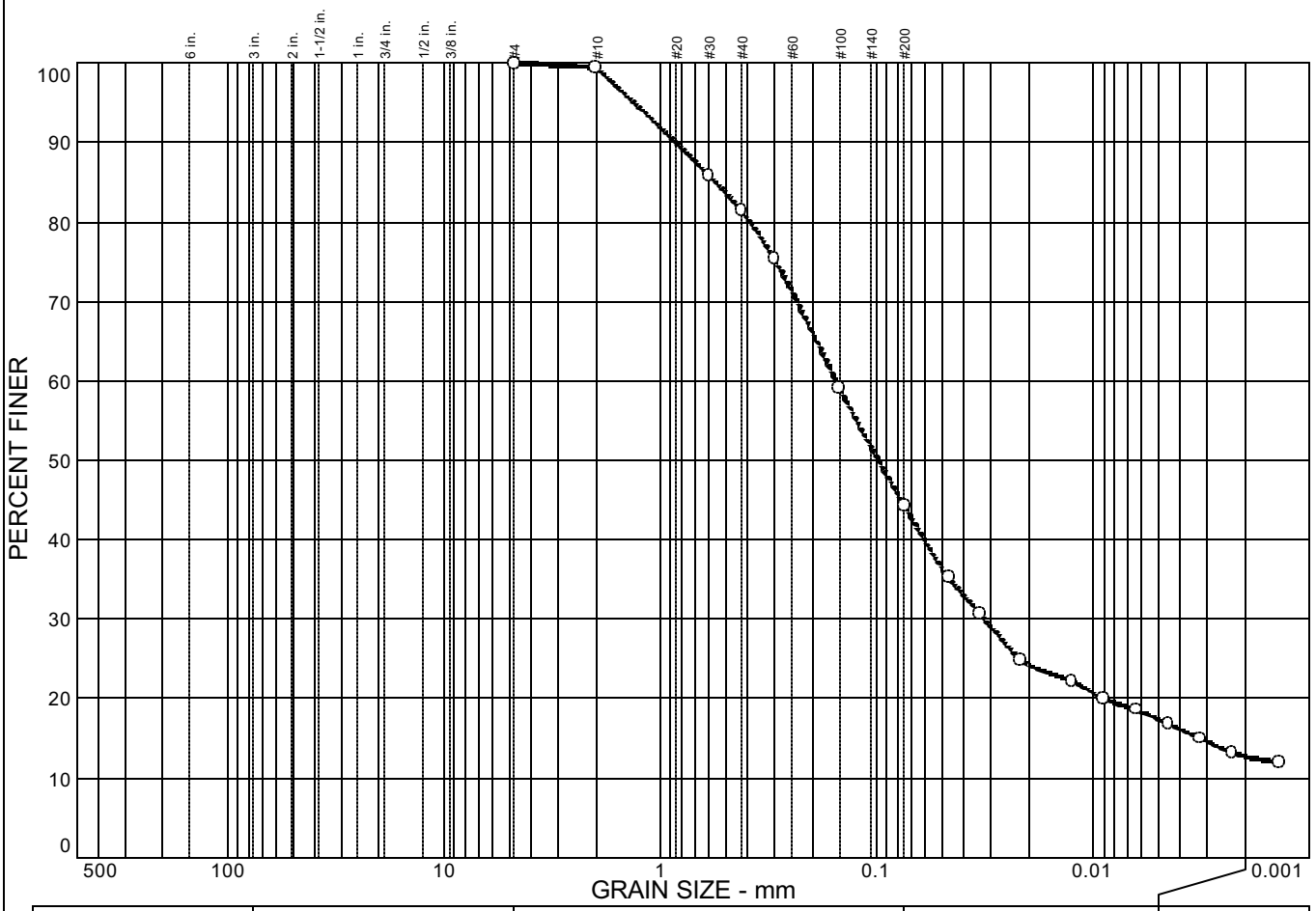
	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES	GRAVEL		SAND			SILT & CLAY
	0.2%		63.5%			36.2%

REMARKS:

PACIFIC GEOTECHNICAL ENGINEERING | **Figure C-9**

RevOct20070

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	55.8	31.5	12.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#30	85.9		
#40	81.4		
#50	75.3		
#100	59.1		
#200	44.2		
0.0466 mm.	35.2		
0.0335 mm.	30.7		
0.0216 mm.	24.9		
0.0126 mm.	22.2		
0.0090 mm.	20.0		
0.0064 mm.	18.6		
0.0045 mm.	16.8		
0.0032 mm.	15.0		
0.0023 mm.	13.2		
0.0014 mm.	12.0		

* (no specification provided)

Soil Description

Olive Silty, Clayey SAND

Atterberg Limits

PL= 17 LL= 22 PI= 5

Coefficients

D_{85}= 0.557 D_{60}= 0.156 D_{50}= 0.0992
D_{30}= 0.0319 D_{15}= 0.0032 D_{10}=
C_u= C_c=

Classification

USCS= SC-SM AASHTO=

Remarks

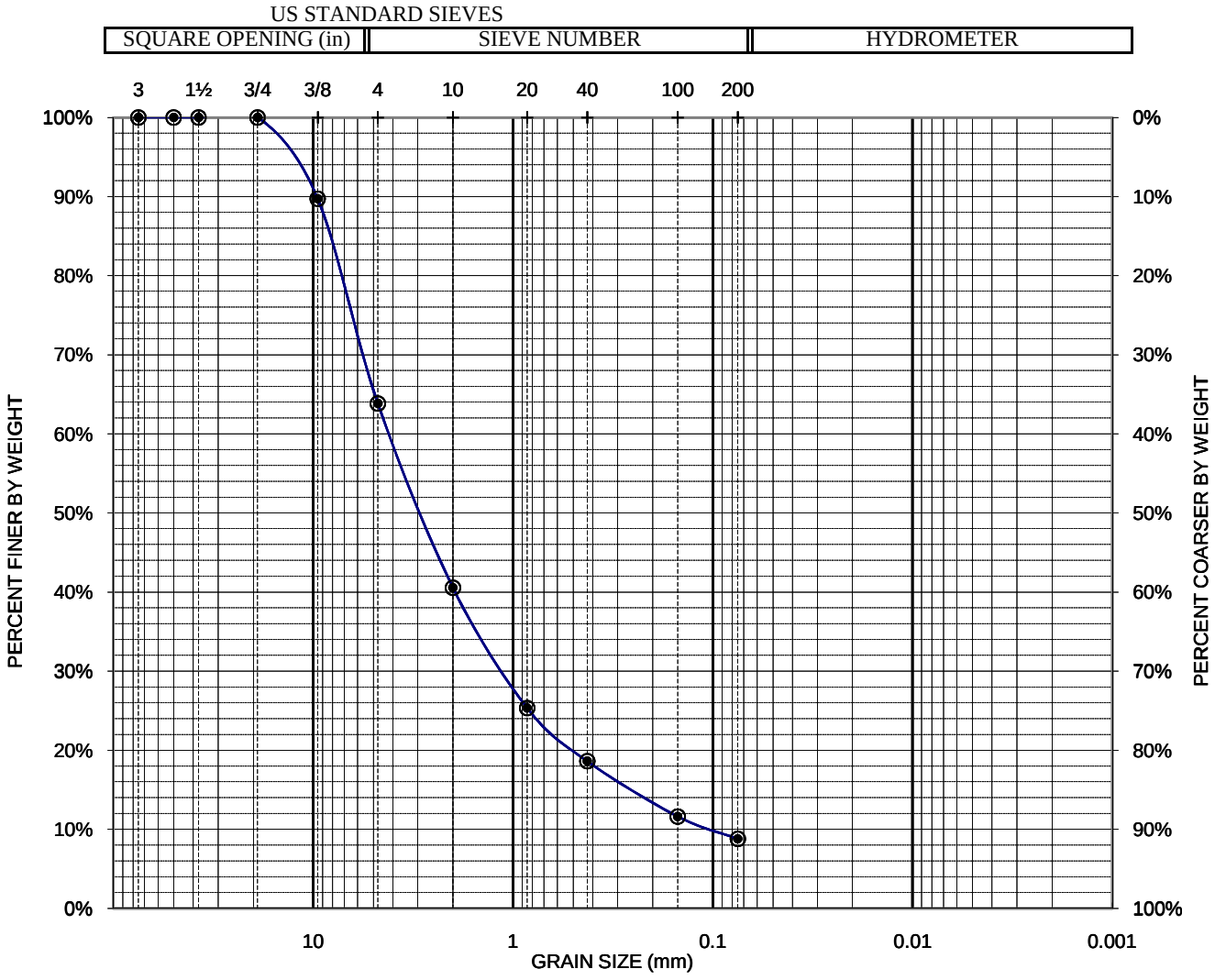
Sample No.: **Source of Sample:** B-4 **Date:**
Location: **Elev./Depth:** 12-13'

COOPER TESTING LABORATORY

Client: Pacific Geotechnical Engineering
Project: Stevens Creek Levees Recertification - 2227E
Project No: 226-173 **Figure** C-10

GRAIN SIZE TEST RESULTS

PROJECT NAME	SCVWD Stevens Creek Levees Recertification					**PROJECT No.**	2227 E
DRILL HOLE No.	B-4	**DEPTH (ft)**	25½	**SAMPLE**	NA	**DATE OF TEST**	11/4/2008
SOURCE/QUARRY:							
DESCRIPTION OF SOIL:	WELL GRADED SAND with GRAVEL and CLAY (SW/SC): Dark yellowish brown (10YR 3/4 to 4/6), wet						



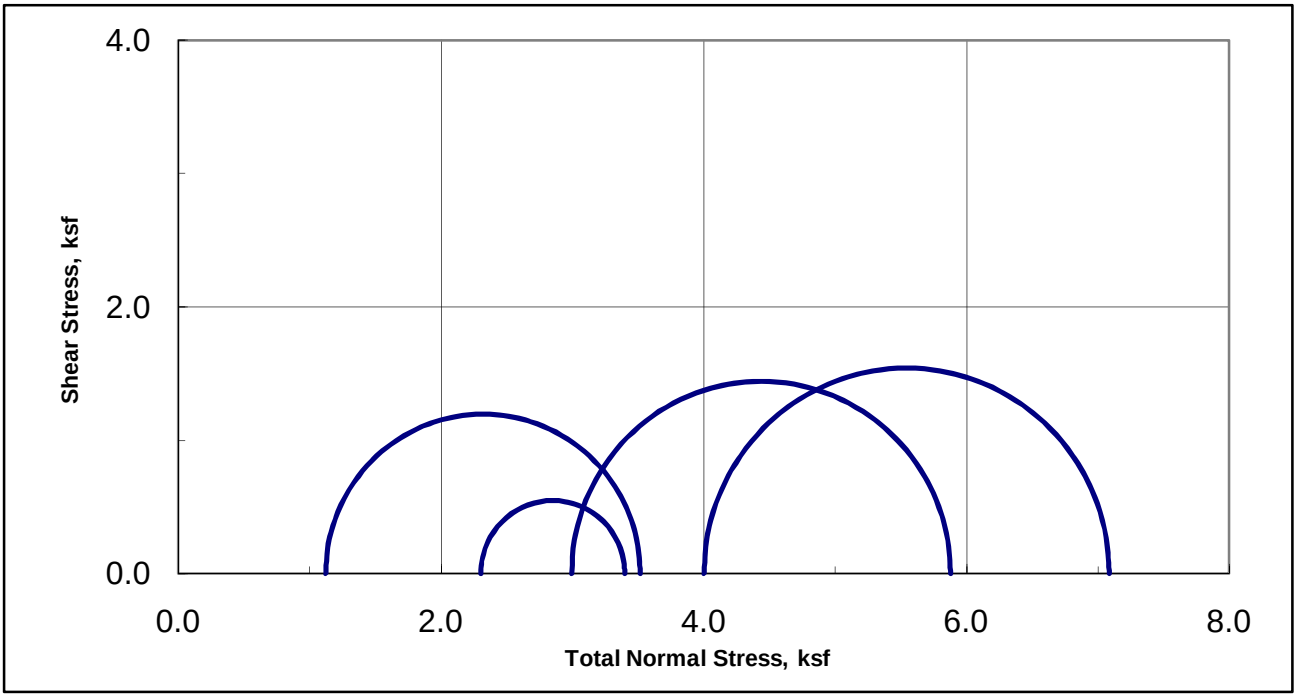
	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES	GRAVEL		SAND			SILT & CLAY
	36.2%		55.0%			8.8%

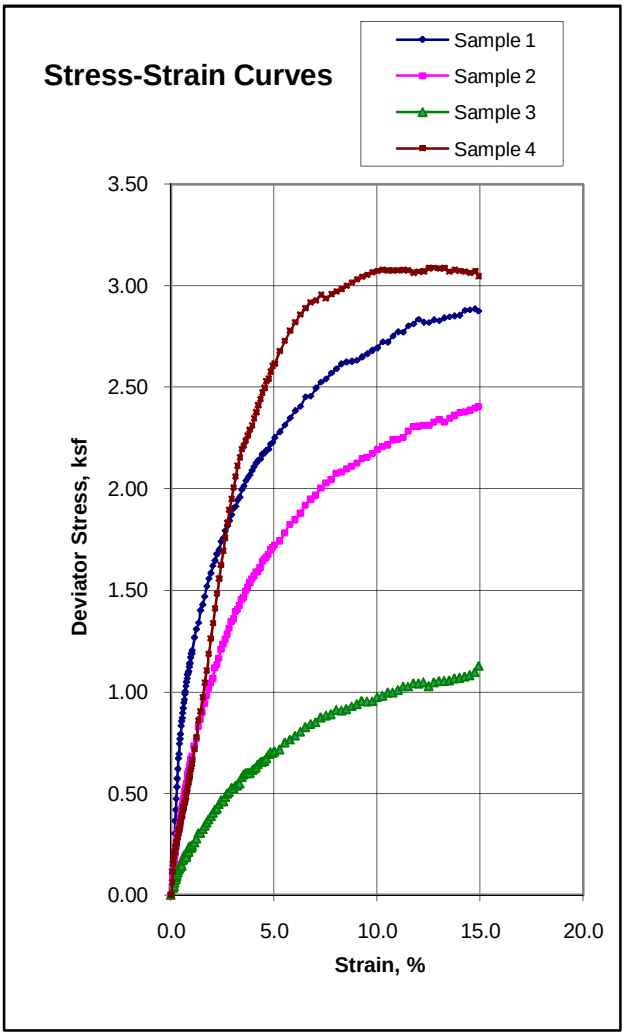
REMARKS:

PACIFIC GEOTECHNICAL ENGINEERING | **Figure** **C-11**

RevOct20070

Unconsolidated-Undrained Triaxial Test
ASTM D-2850





Sample Data				
	1	2	3	4
Moisture %	24.8	32.2	36.7	26.4
Dry Den,pcf	100.8	90.1	84.6	98.4
Void Ratio	0.671	0.870	0.991	0.713
Saturation %	99.9	99.9	99.9	99.8
Height in	5.03	5.03	5.00	5.99
Diameter in	2.44	2.44	2.42	2.89
Cell psi	20.8	7.8	16.0	27.8
Strain %	14.80	14.80	14.90	13.30
Deviator, ksf	2.886	2.402	1.127	3.087
Rate %/min	0.99	0.99	1.00	1.00
in/min	0.050	0.050	0.050	0.060
Job No.:	226-173a			
Client:	Pacific Geotechnical Engineering			
Project:	Stevens Creek Levees - 2227E			
Boring:	B-1	B-2	B-2	B-2
Sample:				
Depth ft:	28.5	9	18.5	45-46

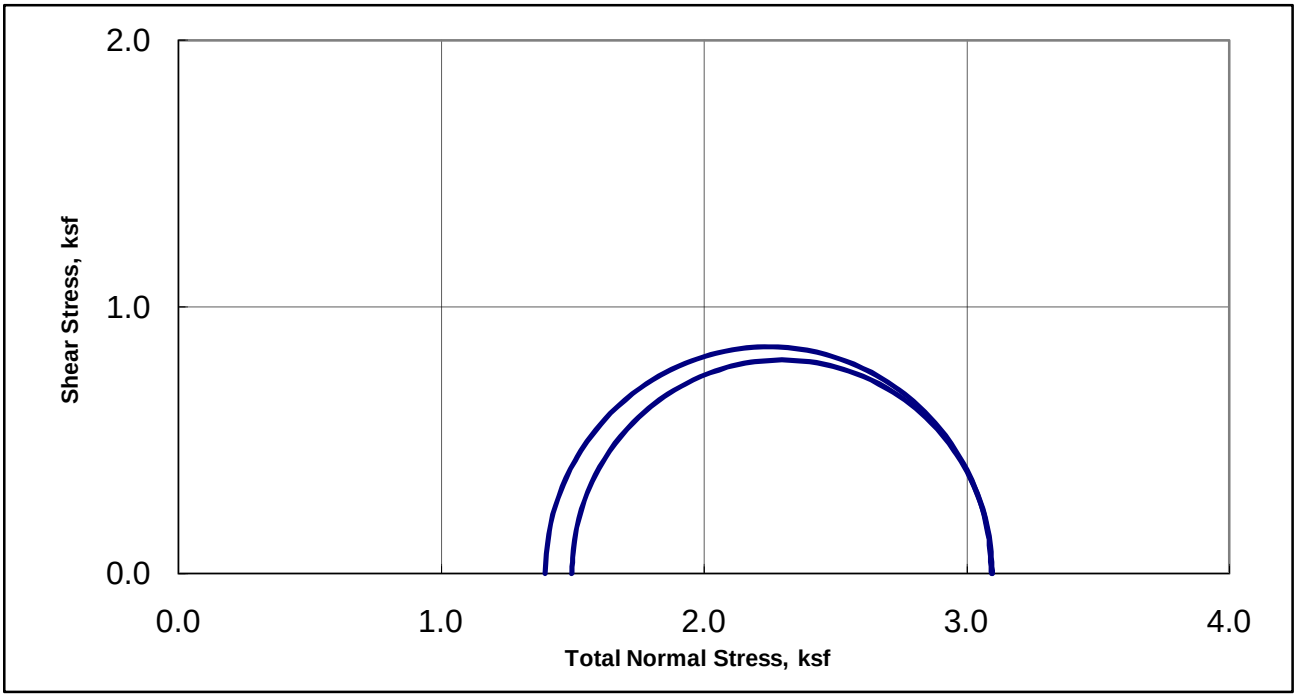
Visual Soil Description	
Sample #	
1	Gray Sandy CLAY
2	Brown CLAY
3	Gray CLAY, trace Sand
4	Grayish Brown Sandy Lean CLAY

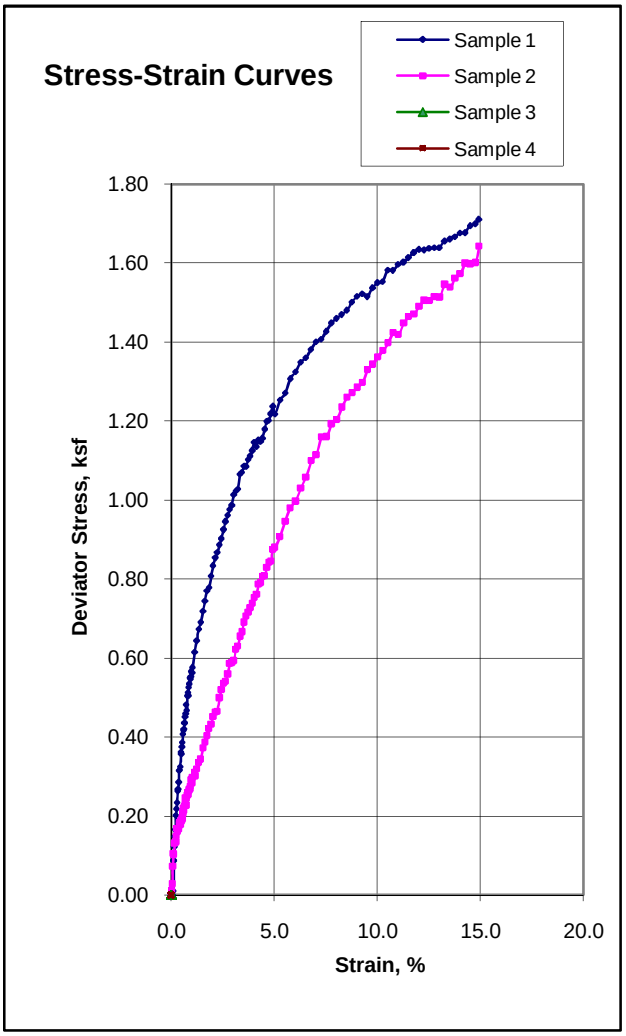
Remarks:

Figure C-12

Unconsolidated-Undrained Triaxial Test

ASTM D-2850



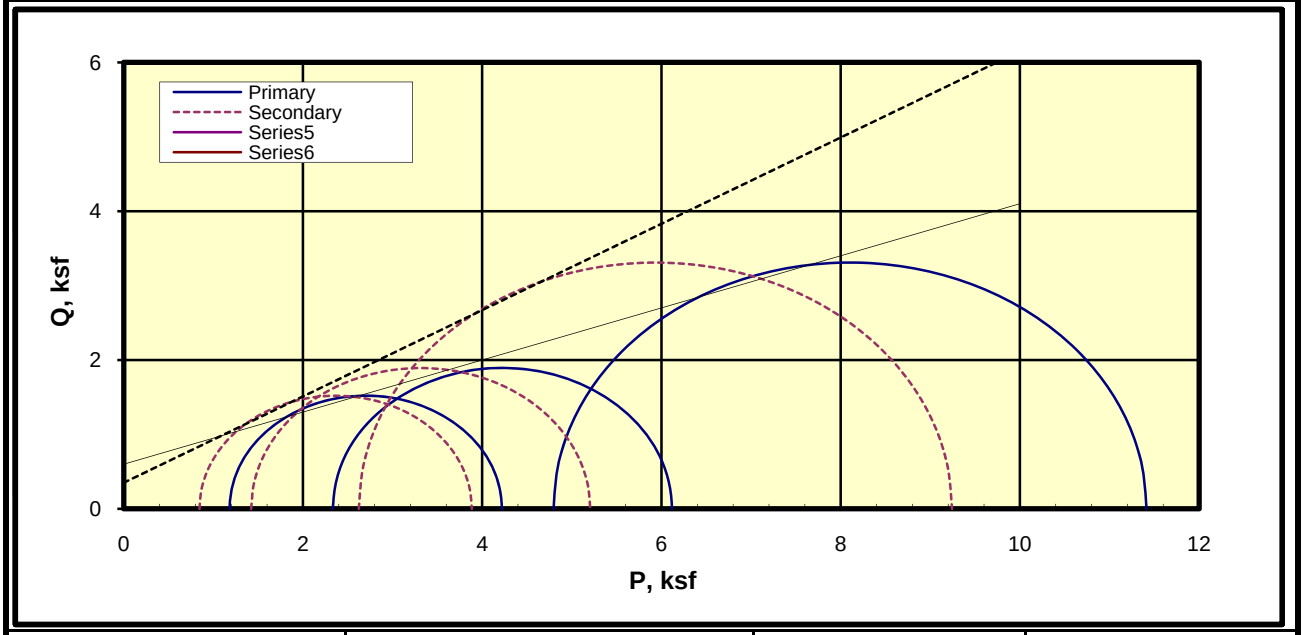


Sample Data				
	1	2	3	4
Moisture %	35.9	27.7		
Dry Den,pcf	85.3	96.3		
Void Ratio	0.977	0.751		
Saturation %	99.2	99.6		
Height in	5.02	5.01		
Diameter in	2.42	2.41		
Cell psi	9.7	10.4		
Strain %	14.90	14.90		
Deviator, ksf	1.710	1.642		
Rate %/min	1.00	1.00		
in/min	0.050	0.050		
Job No.:	226-173b			
Client:	Pacific Geotechnical Engineering			
Project:	Stevens Creek Levees - 2227E			
Boring:	B-3	B-4		
Sample:				
Depth ft:	16	16		

Visual Soil Description	
Sample #	
1	Brown CLAY
2	Brown CLAY w/ Sand & nodules (Silty)
3	
4	
Remarks:	

Figure C-13

Summary of Triaxial Compression Data



Total phi:	**19.3**	**Total C, ksf:**	**0.6**	**Eff. phi:**	**30.1**	**Eff. C, ksf:**	**0.35**

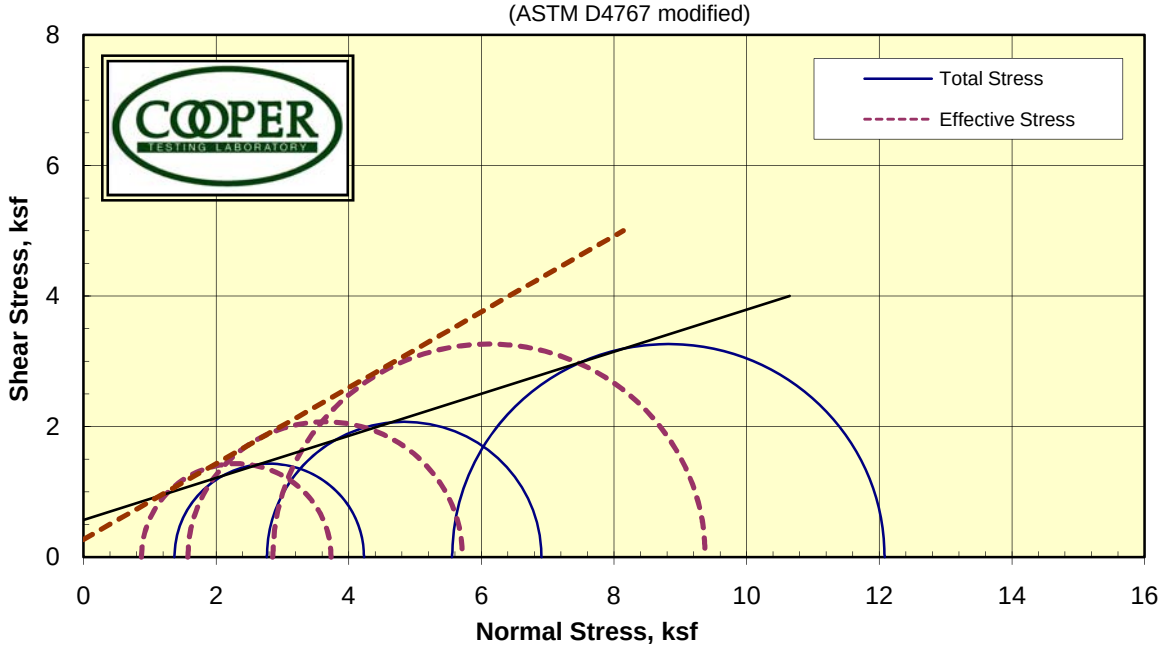
Sample:	1	2	3	4	5	6	7	8
Sample No.:	**1 @ 19.5' (stage 1)**	**1 @ 19.5' (stage 2)**	**1 @ 19.5' not staged**					
	Initial Moisture Density							
MC, %	25.0	25.0	26.7					
DD, pcf	98.9	98.9	97.2					
Sat. %	96.2	96.2	98.2					
Void Ratio	0.703	0.703	0.734					
Diameter, in	2.88	2.88	2.86					
Height, in	6.00	6.00	6.00					
	Final Moisture-Density Data							
MC, %	24.5	23.1	26.5					
DD, pcf	101.0	103.4	98.2					
Saturation %	100.0	100.0	100.0					
Void Ratio	0.662	0.624	0.716					
Diameter, in	2.86	2.87	2.85					
Height, in	5.95	5.75	5.96					
Cell, psi	55.1	71.8	46.8					
BP, psi	38.9	38.5	38.6					
	Effective Stresses At:							
Strain, %	5.0	5.0	5.0					
Deviator, ksf	3.785	6.619	3.040					
Excess PP, ksf	0.91	2.17	0.34					
Sigma 1, ksf	5.206	9.242	3.885					
Sigma 3, ksf	1.421	2.623	0.845					
P, ksf	3.314	5.933	2.365					
Q, ksf	1.892	3.310	1.520					
Stress Ratio	3.663	3.523	4.596					
Rate, in/min	0.001	0.001	0.001					

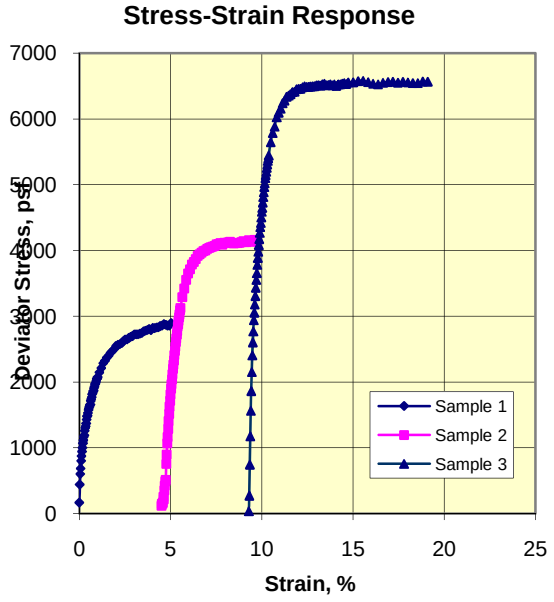
Client Name:	Pacific Geotechnical Eng.	**Job No.:**	2227E	**CTL No.:**	226-173b

Figure C-14

Triaxial Consolidated Undrained

(ASTM D4767 modified)





Stage	1	2	3
MC, %	28.7		
Dry Dens., pcf.	94.9		
Sat. %	99.9		
Void Ratio	0.776		
Diameter in	2.86		
Height, in	6.00		
	Final		
MC, %	30.2	29.1	27.5
Dry Dens., pcf.	96.2	97.9	100.4
Sat. %	100.0	100.0	100.0
Void Ratio	0.815	0.785	0.742
Diameter, in	2.85	2.88	2.90
Height, in	5.96	5.75	5.51
Cell, psi	48.2	57.9	77.4
BP, psi	38.7	38.7	38.8
	Effective Stresses At:		
Strain, %	5.0	5.0	5.0
Deviator ksf	2.860	4.143	6.526
Excess PP	0.497	1.191	2.705
Sigma 1	3.735	5.717	9.380
Sigma 3	0.874	1.574	2.853
P, ksf	2.304	3.646	6.116
Q, ksf	1.430	2.072	3.263
Stress Ratio	4.272	3.633	3.287
Rate in/min	0.001	0.001	0.001

Job No.: 226-173 **Date:** 10/29/2008

Client: Pacific Geotechnical Eng. BY:DC

Project: 2227E

Sample: B-2 @ 25 (Tip-9.5") Brown Lean CLAY w/ Sand

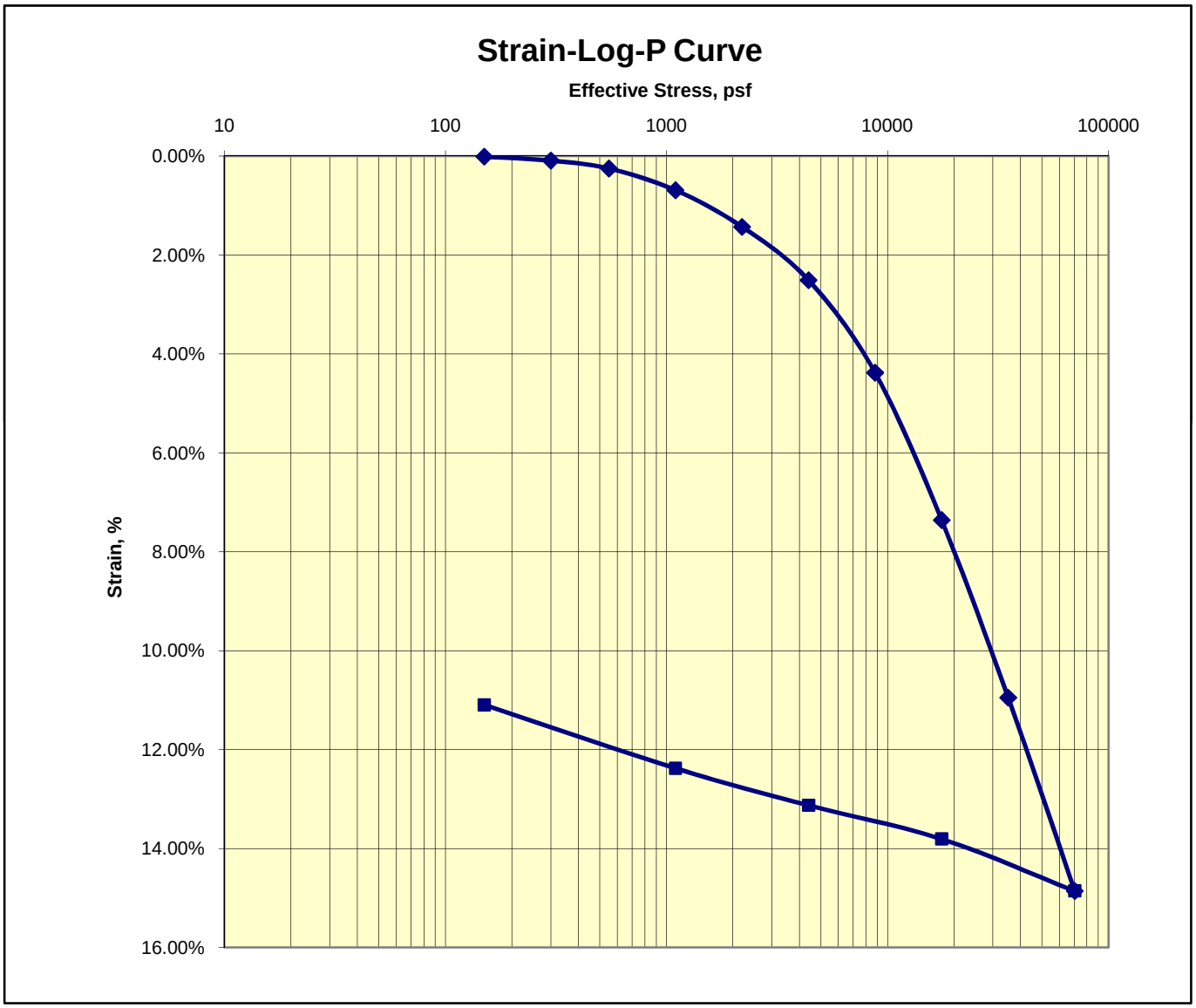
Remarks: ** Staged Test ** Strengths at 5% strain.

Total C	0.57	Effective C	0.27
Total Phi	17.9	Effective Phi	30.2

Figure C-15

Consolidation Test
ASTM D2435

Job No.:	226-173	**Boring:**	B-1	**Run By:**	MD
Client:	Pacific Geotechnical Eng	**Sample:**		**Reduced:**	PJ
Project:	2227E	**Depth, ft.:**	19.5-21	**Checked:**	PJ/DC
Soil Type:	Greenish Gray CLAY w/ Sand (Very Silty)			**Date:**	11/3/2008



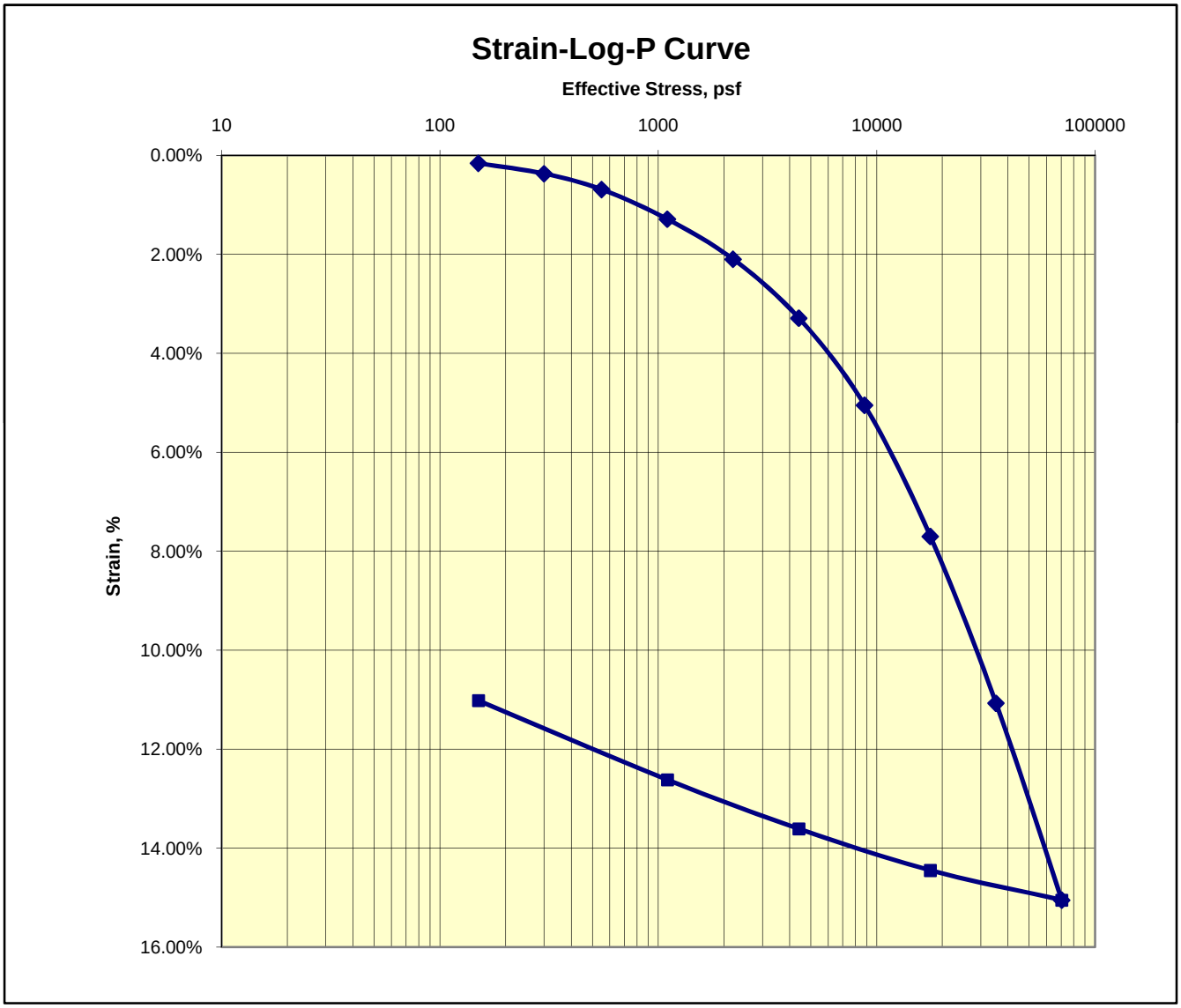
Ass. Gs = 2.7	Initial	Final
Moisture %:	30.2	22.3
Dry Density, pcf:	92.7	105.4
Void Ratio:	0.819	0.600
% Saturation:	99.6	100

Remarks:

Figure C-16

Consolidation Test
ASTM D2435

Job No.:	226-173	**Boring:**	B-2	**Run By:**	MD
Client:	Pacific Geotechnical Eng	**Sample:**		**Reduced:**	PJ
Project:	2227E	**Depth, ft.:**	25-27.5	**Checked:**	PJ/DC
Soil Type:	Brown Lean CLAY w/ Sand			**Date:**	11/3/2008



Ass. Gs = 2.8	**Initial**	**Final**
Moisture %:	26.6	23.1
Dry Density, pcf:	95.7	106.2
Void Ratio:	0.826	0.645
% Saturation:	90.1	100

Remarks:

Figure C-17

APPENDIX E

Summary of Liquefaction Analysis Results

Attachment E.1 – SPT Liquefaction Results

Attachment E.2 – CLiq Liquefaction Results

APPENDIX E

LIQUEFACTION ANALYSES

Stevens Creek Levee Recertification
Mountain View, California

Liquefaction susceptibility has been evaluated for design level ground shaking, defined as a peak ground acceleration (PGA) that has probability of exceedance of 10 percent in 50 years. Based on this definition, we used a PGA of 0.48g, with a typical (modal) Moment Magnitude of 7.9.

Liquefaction susceptibility of materials encountered in the borings has been evaluated using a spreadsheet developed by AMEC Geomatrix. We have generally followed the methods of Youd et al. (2001). For hammer energy, we have conservatively assumed a 60 percent efficiency (matching the standard value for rope-and-cathead testing). The method for analyzing the amount of settlement during a seismic event of saturated soils follows Tokimatsu and Seed (1984).

Liquefaction susceptibility of materials encountered in the CPTs has been evaluated by the computer program CLiq (Version 1.2, 2007), developed by GeoLogismiki in collaboration with Peter Robertson of Gregg Drilling. An explanation of the calculation methods used by CLiq follows the spreadsheets for the borings, and the results of the complete analyses follow the explanation of the method.

ATTACHMENT E.1

SPT Liquefaction Results

STANDARD PENETRATION TEST DATA

Parameter	Value	Units	Notes
Magnitude =	7.9		
a =	0.48	g	g=gravity
o1 = other w/ efficiency	112%	%	
o2 = other w/efficiency	133%	%	
Borehole diameter	8	in	200

Key:	
Entered	Value
Calculated	Value
Assumed	Value
	Auger boring unreliable for liquefaction anaylsis

Seismic Groundwater (ft) = 8

Boring Number	Sample Depth (ft)	N	Sampler Type	Sampler Designed to Have Liners? (y/n)	Hammer Configuration	C_R	C_s	C_S	C_E	C_B	N_{60}	gwt (ft)	γ (pcf)	σ (psf)	σ' (psf)	C_N	$(N_1)_{60}$	USCS	FC (%)	Alpha	Beta	(N1)60-cs	CRR7.5 CS	CRR7.5	rd	CSR	MSF	Ks	CSR7.5	FS
B-1	2.0	61	m	n	o2	0.75	0.65	1.0	1.33	1.15	46	19	125	250	250	1.7	77	SC-GC	10	0.87	1.02	80	-	0.54	1.00	0.31	0.88	1.00	0.35	-
B-1	4.5	92	m	n	o2	0.75	0.65	1.0	1.33	1.15	60	19	125	562.5	563	1.7	101	SC-GC	10	0.87	1.02	104	-	0.73	0.99	0.31	0.88	1.00	0.35	-
B-1	6.5	21	m	n	o2	0.75	0.65	1.0	1.33	1.15	14	19	125	812.5	813	1.6	21	SC	27	4.48	1.13	28	0.38	0.23	0.98	0.31	0.88	1.00	0.35	-
B-1	9.5	35	m	n	o2	0.75	0.65	1.0	1.33	1.15	23	19	125	1187.5	1188	1.3	29	CH	50	5.00	1.20	40	-	0.41	0.98	0.31	0.88	1.00	0.35	-
B-1	14.5	22	m	n	o2	0.85	0.65	1.0	1.33	1.15	16	19	125	1812.5	1813	1.1	17	CH	50	5.00	1.20	25	0.30	0.18	0.97	0.30	0.88	1.00	0.34	-
B-1	19.5	12	m	n	o2	0.85	0.65	1.0	1.33	1.15	9	19	125	2437.5	2406	0.9	8	CL	50	5.00	1.20	15	0.16	0.10	0.95	0.30	0.88	0.97	0.36	-
B-1	24.5	22	m	n	o2	0.95	0.65	1.0	1.33	1.15	18	19	125	3062.5	2719	0.9	16	CL	50	5.00	1.20	24	0.28	0.17	0.94	0.33	0.88	0.94	0.40	-
B-1	26.0	23	SPT	n	o2	0.95	1	1.0	1.33	1.15	29	19	125	3250	2813	0.8	25	SC	32	4.83	1.17	34	-	0.29	0.94	0.34	0.88	0.93	0.41	-
B-1	29.5	14	m	n	o2	0.95	0.65	1.0	1.33	1.15	12	19	125	3687.5	3032	0.8	9	CL	50	5.00	1.20	16	0.17	0.10	0.93	0.35	0.88	0.91	0.44	-
B-1	34.5	23	m	n	o2	1	0.65	1.0	1.33	1.15	20	19	125	4312.5	3345	0.8	15	CL	50	5.00	1.20	23	0.26	0.16	0.89	0.36	0.88	0.89	0.46	-
AB-B-3	5.0	36	SPT	y	rs	0.75	1	1.3	1.00	1.00	35	9	125	625	625	1.7	60	CH	50	5.00	1.20	77	-	0.40	0.99	0.31	0.88	1.00	0.35	-
AB-B-3	10.0	26	SPT	y	rs	0.8	1	1.3	1.00	1.00	26	9	125	1250	1188	1.3	34	CH	50	5.00	1.20	46	-	#DIV/0!	0.98	0.32	0.88	1.00	0.37	-
AB-B-3	15.0	23	SPT	y	rs	0.85	1	1.2	1.00	1.00	24	9	125	1875	1501	1.2	28	ML	50	5.00	1.20	39	-	0.37	0.97	0.38	0.88	1.00	0.43	-
AB-B-3	20.0	18	SPT	y	rs	0.95	1	1.2	1.00	1.00	21	9	125	2500	1814	1.1	22	CL	50	5.00	1.20	31	-	0.24	0.95	0.41	0.88	1.00	0.47	-
AB-B-3	25.0	21	SPT	y	rs	0.95	1	1.2	1.00	1.00	25	9	125	3125	2127	1.0	24	CL	50	5.00	1.20	34	-	0.27	0.94	0.43	0.88	1.00	0.49	-
AB-B-3	30.0	16	SPT	y	rs	0.95	1	1.2	1.00	1.00	18	9	125	3750	2440	0.9	16	CL	50	5.00	1.20	24	0.28	0.17	0.93	0.45	0.88	0.97	0.53	-
AB-B-5	5.0	47	SPT	y	rs	0.75	1	1.3	1.00	1.00	46	10	125	625	625	1.7	78	CH	50	5.00	1.20	99	-	0.55	0.99	0.31	0.88	1.00	0.35	-
AB-B-5	10.0	24	SPT	y	rs	0.8	1	1.3	1.00	1.00	24	10	125	1250	1250	1.3	30	CH	50	5.00	1.20	41	-	0.47	0.98	0.30	0.88	1.00	0.35	-
AB-B-5	15.0	20	SPT	y	rs	0.85	1	1.2	1.00	1.00	21	10	125	1875	1563	1.1	23	CL	50	5.00	1.20	33	-	0.26	0.97	0.36	0.88	1.00	0.41	-
AB-B-5	20.0	10	SPT	y	rs	0.95	1	1.1	1.00	1.00	11	10	125	2500	1876	1.0	11	CL	50	5.00	1.20	18	0.19	0.12	0.95	0.40	0.88	1.00	0.45	-
AB-B-5	25.0	17	SPT	y	rs	0.95	1	1.2	1.00	1.00	19	10	125	3125	2189	1.0	18	CL	50	5.00	1.20	27	0.33	0.19	0.94	0.42	0.88	0.99	0.48	-
AB-B-5	30.0	28	SPT	y	rs	0.95	1	1.3	1.00	1.00	34	10	125	3750	2502	0.9	31	SM	23	4.06	1.10	38	-	0.56	0.93	0.43	0.88	0.96	0.52	-
B-2	1.5	66	m	n	o2	0.75	0.65	1.0	1.33	1.15	43	70	125	187.5	188	1.7	73	CL-CH	50	5.00	1.20	93	-	0.51	1.00	0.31	0.88	1.00	0.35	-
B-2	4.0	28	m	n	o2	0.75	0.65	1.0	1.33	1.15	18	70	125	500	500	1.7	31	CH	50	5.00	1.20	42	-	0.56	0.99	0.31	0.88	1.00	0.35	-
B-2	6.5	26	m	n	o2	0.75	0.65	1.0	1.33	1.15	17	70	125	812.5	813	1.6	27	CH	50	5.00	1.20	37	-	0.34	0.98	0.31	0.88	1.00	0.35	-
B-2	9.5	11	m	n	o2	0.75	0.65	1.0	1.33	1.15	7	70	125	1187.5	1188	1.3	9	CH	50	5.00	1.20	16	0.17	0.10	0.98	0.31	0.88	1.00	0.35	-
B-2	14.5	14	m	n	o2	0.85	0.65	1.0	1.33	1.15	10	70	125	1812.5	1813	1.1	11	CL	50	5.00	1.20	18	0.19	0.12	0.97	0.30	0.88	1.00	0.34	-
B-2	19.5	14	m	n	o2	0.85	0.65	1.0	1.33	1.15	10	70	125	2437.5	2438	0.9	9	CL	29	4.64	1.15	15	0.16	0.10	0.95	0.30	0.88	0.97	0.35	-
B-2	24.5	14	m	n	o2	0.95	0.65	1.0	1.33	1.15	12	70	125	3062.5	3063	0.8	9	CL	50	5.00	1.20	16	0.17	0.10	0.94	0.29	0.88	0.91	0.37	-
B-2	29.0	13	m	n	o2	0.95	0.65	1.0	1.33	1.15	11	70	125	3625	3625	0.7	8	CL	50	5.00	1.20	15	0.16	0.10	0.93	0.29	0.88	0.87	0.38	-
B-2	30.5	10	SPT	n	o2	0.95	1	1.0	1.33	1.15	13	70	125	3812.5	3813	0.7	9	SC	23	4.06	1.10	14	0.15	0.10	0.93	0.29	0.88	0.86	0.38	**0.39**
B-2	34.5	4	SPT	n	o2	1	1	1.0	1.33	1.15	5	70	125	4312.5	4313	0.7	4	CL	59	5.00	1.20	10	0.11	0.06	0.89	0.28	0.88	0.84	0.38	-
B-2	39.5	30	m	n	o2	1	0.65	1.0	1.33	1.15	26	70	125	4937.5	4938	0.6	16	CL	50	5.00	1.20	24	0.28	0.17	0.85	0.27	0.88	0.81	0.38	-
B-2	44.5	18	m	n	o2	1	0.65	1.0	1.33	1.15	16	70	125	5562.5	5563	0.6	9	CL	50	5.00	1.20	16	0.17	0.10	0.81	0.25	0.88	0.79	0.37	-
B-2	49.5	16	m	n	o2	1	0.65	1.0	1.33	1.15	14	70	125	6187.5	6188	0.6	8	CL	57	5.00	1.20	15	0.16	0.10	0.77	0.24	0.88	0.76	0.36	-
B-2	54.5	46	m	n	o2	1	0.65	1.0	1.33	1.15	40	70	125	6812.5	6813	0.5	22	CH	50	5.00	1.20	31	-	0.24	0.73	0.23	0.88	0.75	0.35	-
B-2	59.5	46	m	n	o2	1	0.65	1.0	1.33	1.15	40	70	125	7437.5	7438	0.5	21	CH	50	5.00	1.20	30	-	0.23	0.69	0.22	0.88	0.73	0.34	-
B-2	64.5	48	m	n	o2	1	0.65	1.0	1.33	1.15	42	70	125	8062.5	8063	0.5	21	CH	50	5.00	1.20	30	-	0.23	0.65	0.20	0.88	0.72	0.32	-
B-2	69.5	21	m	n	o2	1	0.65	1.0	1.33	1.15	18	70	125	8687.5	8688	0.5	9	CL	59	5.00	1.20	16	0.17	0.10	0.61	0.19	0.88	0.70	0.31	-
AB-B-6	5.0	40	SPT	y	rs	0.75	1	1.3	1.00	1.00	39	4.5	125	625	594	1.7	66	CH	50	5.00	1.20	84	-	0.45	0.99	0.32	0.88	1.00	0.37	-
AB-B-6	10.0	31	SPT	y	rs	0.8	1	1.3	1.00	1.00	32	4.5	125	1250	907	1.5	48	CH	50	5.00	1.20	63	-	0.28	0.98	0.42	0.88	1.00	0.48	-
AB-B-6	15.0	13	SPT	y	rs	0.85	1	1.2	1.00	1.00	13	4.5	125	1875	1220	1.3	17	CL	50	5.00	1.20	25	0.30	0.18	0.97	0.46	0.88	1.00	0.53	-
AB-B-6	20.0	11	SPT	y	rs	0.95	1	1.1	1.00	1.00	12	4.5	125	2500	1533	1.1	14	CL	50	5.00	1.20	22	0.24	0.15	0.95	0.49	0.88	1.00	0.55	-
AB-B-6	25.0	13	SPT	y	rs	0.95	1	1.2	1.00	1.00	14	4.5	125	3125	1846	1.0	15	CL	50	5.00	1.20	23	0.26	0.16	0.94	0.50	0.88	1.00	0.57	-
AB-B-8	5.0	26	SPT	y	rs	0.75	1	1.3	1.00	1.00	25	10	125	625	625	1.7	42	SM	23	4.06	1.10	50	-	0.18	0.99	0.31	0.88	1.00	0.35	-
AB-B-8	10.0	22	SPT	y	rs	0.8	1	1.2	1.00	1.00	22	10	125	1250	1250	1.3	28	CL	50	5.00	1.20	39	-	0.37	0.98	0.30	0.88	1.00	0.35	-
AB-B-8	15.0	7	SPT	y	rs	0.85	1	1.1	1.00	1.00	7	10	125	1875	1563	1.1	7	CL	50	5.00	1.20	13	0.14	0.09	0.97	0.36	0.88	1.00	0.41	-
AB-B-8	20.0	8	SPT	y	rs	0.95	1	1.1	1.00	1.00	9	10	125	2500	1876	1.0	9	CL	50	5.00	1.20	16	0.17	0.10	0.95	0.40	0.88	1.00	0.45	-
AB-B-8	25.0	11	SPT	y	rs	0.95	1	1.1	1.00	1.00	12	10	125	3125	2189	1.0	11	CL	50	5.00	1.20	18	0.19	0.12	0.94	0.42	0.88	0.99	0.48	-
AB-B-8	30.0	80	SPT	y	rs	0.95	1	1.3	1.00	1.00	99	10	125	3750	2502	0.9	88	SP	0	0.00	1.00	88	-	0.63	0.93	0.43	0.88	0.96	0.52	-
AB-B-10	6.5	24	SPT	y	rs	0.75	1	1.3	1.00	1.00	23	8	125	812.5	813	1.6	35	CH	50	5.00	1.20	47	-	-0.75	0.98	0.31	0.88	1.00	0.35	-
AB-B-10	11.5	27	SPT	y	rs	0.8	1	1.3	1.00	1.00	28	8	125	1437.5	1219	1.3	35	GM	23	4.06	1.10	43	-	-0.75	0.97	0.36	0.88	1.00	0.41	-
AB-B-10	16.5	13	SPT	y	rs	0.85	1	1.2	1.00	1.00	13	8	125	2062.5	1532	1.1	15	SM	23	4.06	1.10	21	0.22	0.16	0.96	0.40	0.88	1.00	0.46	**0.48**
AB-B-10	21.5	80	SPT	y	rs	0.95	1	1.3	1.00	1.00	99	8	125	2687.5	1845	1.0	103	CL	50	5.00	1.20	129	-	0.74	0.95	0.43	0.88	1.00	0.49	-
AB-B-10	26.5	26	SPT	y	rs	0.95	1	1.3	1.00	1.00	31	8	125	3312.5	2158	1.0	30	CL	50	5.00	1.20	41	-	0.47	0.94	0.45	0.88	1.00	0.52	-
AB-B-10	31.5	37	SPT	y	rs	0.95	1	1.3	1.00	1.00	46	8	125	3937.5	2471	0.9	41	SM	23	4.06	1.10	49	-	0.16	0.92	0.46	0.88	0.96	0.54	-
AB-B-10	36.5	56	SPT	y	rs	1	1	1.3	1.00	1.00	73	8	125	4562.5	2784	0.8	62	ML	50	5.00	1.20	79	-	0.42	0.88	0.45	0.88	0.93	0.55	-
AB-B-10	41.5	100	SPT	y	rs	1	1	1.3	1.00	1.00	130	8	125	5187.5	3097	0.8	104	ML	50	5.00	1.20	130	-	0.75	0.84	0.44	0.88	0.91	0.55	-
AB-B-2	5.0	25	SPT	y	rs	0.75	1	1.3	1.00	1.00	24	8	125	625	625	1.7	40	CH	50	5.00	1.20	53	-	0.12	0.99	0.31	0.88	1.00	0.35	-
AB-B-2	10.0	100	SPT	y	rs	0.8	1	1.3	1.00	1.00	104	8	125	1250	1125	1.3	139	GM	23	4.06	1.10	157	-	1.02	0.98	0.34	0.88	1.00	0.39	-
AB-B-2	15.0	48	SPT	y	rs	0.85	1	1.3	1.00	1.00	53	8	125	1875	1438	1.2	63	GM	23	4.06	1.10	73	-	0.43	0.97	0.39	0.88	1.00	0.45	-
AB-B-2	20.0	30	SPT	y	rs	0.95	1	1.3	1.00	1.00	37	8	125	2500	1751	1.1	40	GM	23	4.06	1.10	48	-	0.12	0.95	0.42	0.88	1.00	0.48	-
AB-B-4	5.0	41	SPT	y	rs	0.75	1	1.3	1.00	1.00	40	8	125	625	625	1.7	68	CH	50	5.00	1.20	87	-	0.47	0.99	0.31	0.88	1.00	0.35	-
AB-B-4	10.0	21	SPT	y	rs	0.8	1	1.2	1.00	1.00	21	8	125	1250	1125	1.3	27	CH	50	5.00	1.20	37	-	0.34	0.98	0.34	0.88	1.00	0.39	-
AB-B-4	15.0	11	SPT	y	rs	0.85	1	1.1	1.00	1.00	11	8	125	1875	1438	1.2	13	ML	50	5.00	1.20	21	0.22	0.14	0.97	0.39	0.88	1.00	0.45	**0.50**
AB-B-4	20.0	16	SPT	y	rs	0.95	1	1.2	1.00	1.00	18	8	125	2500	1751	1.1	19	ML	50	5.00	1.20	28	0.36	0.20	0.95	0.42	0.88	1.00	0.48	**0.75**
AB-B-4	25.0	47	SPT	y	rs	0.95	1	1.3	1.00	1.00	58	8	125	3125	2064	1.0	57	ML	50	5.00	1.20	73	-	0.37	0.94	0.44	0.88	1.00	0.51	-
AB-B-4	30.0	32	SPT	y	rs	0.95	1	1.3	1.00	1.00	40	8	125	3750	2377	0.9	36	SM	23	4.06	1.10	44	-	-0.24	0.93	0.46	0.88	0.97	0.54	-
AB-B-7	5.0	20	SPT	y	rs	0.75	1	1.2	1.00	1.00	18	8	125	625	625	1.7	31	SM	23	4.06	1.10	38	-	0.56	0.99	0.31	0.88	1.00	0.35	-
AB-B-7	10.0	33	SPT	y	rs	0.8	1	1.3	1.00	1.00	34	8	125	1250	1125	1.3	46	SM	23	4.06	1.10	55	-	0.25	0.98	0.34	0.88	1.00	0.39	-
AB-B-7	15.0	20	SPT	y	rs	0.85	1	1.2	1.00	1.00	21	8	125	1875	1438	1.2	24	CL	50	5.00	1.20	34	-	0.27	0.97	0.39	0.88	1.00	0.45	-
AB-B-7	20.0	18	SPT	y	rs	0.95	1	1.2	1.00	1.00	21	8	125	2500	1751	1.1	22	CL	50	5.00	1.20	31	-	0.24	0.95	0.42	0.88	1.00	0.48	-
AB-B-7	25.0	33	SPT	y	rs	0.95	1	1.3	1.00	1.00	41	8	125	3125	2064	1.0	40	CL	50	5.00	1.20	53	-	0.12	0.94	0.44	0.88	1.00	0.51	-
AB-B-7	30.0	14	SPT	y	rs	0.95	1	1.2	1.00	1.00	16	8	125	3750	2377	0.9	14	CL	50	5.00	1.20	22	0.24	0.15	0.93	0.46	0.88	0.97	0.54	-
B-3	2.5	31	m	n	o2	0.75	0.65	1.0	1.33	1.15	20	8	125	312.5	313	1.7	34	CL	50	5.00	1.20	46	-	#DIV/0!	0.99	0.31	0.88	1.00	0.35	-
B-3	4.0	16	m	n	o2	0.75	0.65	1.0	1.33	1.15	10	8	125	500	500	1.7	18	CH,SM,SC	40	5.00	1.20	27	0.33	0.19	0.99	0.31	0.88	1.00	0.35	-
B-3	6.5	12	m	n	o2	0.75	0.65	1.0	1.33	1.15	8	8	125	812.5	813	1.6	12	CH,SM,SC	40	5.00	1.20	19	0.21	0.13	0.98	0.31	0.88	1.00	0.35	-

STANDARD PENETRATION TEST DATA

Parameter	Value	Units	Notes
Magnitude =	7.9		
a =	0.48	g	g=gravity
o1 = other w/ efficiency	112%	%	
o2 = other w/efficiency	133%	%	
Borehole diameter	8	in	200

Key:	
Entered	Value
Calculated	Value
Assumed	Value
	Auger boring unreliable for liquefaction anaylsis

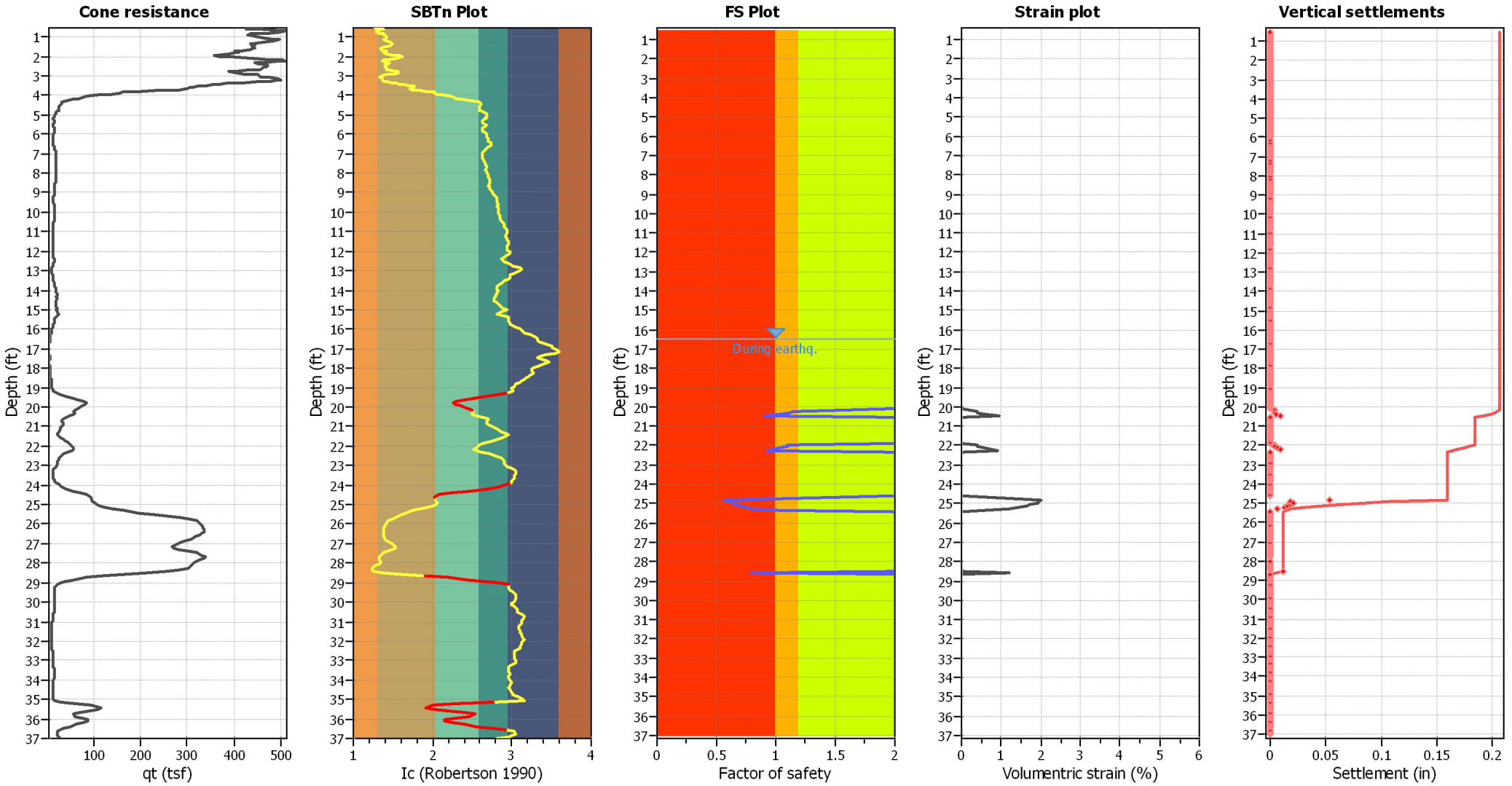
Seismic Groundwater (ft) = 8

B-3	11.5	18	m	n	o2	0.8	0.65	1.0	1.33	1.15	12	8	125	1437.5	1219	1.3	16	CH	50	5.00	1.20	24	0.28	0.17	0.97	0.36	0.88	1.00	0.41	-
B-3	16.5	10	m	n	o2	0.85	0.65	1.0	1.33	1.15	7	8	125	2062.5	1532	1.1	8	CH	50	5.00	1.20	15	0.16	0.10	0.96	0.40	0.88	1.00	0.46	-
B-3	21.5	32	m	n	o2	0.95	0.65	1.0	1.33	1.15	26	8	125	2687.5	1845	1.0	27	CH	50	5.00	1.20	37	-	0.34	0.95	0.43	0.88	1.00	0.49	-
B-3	26.5	26	m	n	o2	0.95	0.65	1.0	1.33	1.15	21	8	125	3312.5	2158	1.0	21	CH	50	5.00	1.20	30	-	0.23	0.94	0.45	0.88	1.00	0.52	-
B-3	31.5	16	m	n	o2	0.95	0.65	1.0	1.33	1.15	13	8	125	3937.5	2471	0.9	12	CL	35	5.00	1.20	19	0.21	0.13	0.92	0.46	0.88	0.96	0.54	-
AB-B-9	5.0	23	SPT	y	rs	0.75	1	1.2	1.00	1.00	22	8	125	625	625	1.7	37	SM-CL	40	5.00	1.20	49	-	-0.06	0.99	0.31	0.88	1.00	0.35	-
AB-B-9	10.0	15	SPT	y	rs	0.8	1	1.2	1.00	1.00	14	8	125	1250	1125	1.3	19	SM	23	4.06	1.10	25	0.29	0.20	0.98	0.34	0.88	1.00	0.39	**0.75**
AB-B-9	15.0	17	SPT	y	rs	0.85	1	1.2	1.00	1.00	17	8	125	1875	1438	1.2	20	SM	23	4.06	1.10	26	0.31	0.22	0.97	0.39	0.88	1.00	0.45	**0.70**
AB-B-9	20.0	15	SPT	y	rs	0.95	1	1.2	1.00	1.00	17	8	125	2500	1751	1.1	18	CL	50	5.00	1.20	27	0.33	0.19	0.95	0.42	0.88	1.00	0.48	-
AB-B-9	25.0	17	SPT	y	rs	0.95	1	1.2	1.00	1.00	19	8	125	3125	2064	1.0	19	CL	50	5.00	1.20	28	0.36	0.20	0.94	0.44	0.88	1.00	0.51	-
AB-B-9	30.0	20	SPT	y	rs	0.95	1	1.2	1.00	1.00	23	8	125	3750	2377	0.9	21	CL	50	5.00	1.20	30	-	0.23	0.93	0.46	0.88	0.97	0.54	-
B-4	2.5	27	m	n	o2	0.75	0.65	1.0	1.33	1.15	18	8	125	312.5	313	1.7	30	SC	23	4.06	1.10	37	-	0.47	0.99	0.31	0.88	1.00	0.35	-
B-4	4.0	13	m	n	o2	0.75	0.65	1.0	1.33	1.15	8	8	125	500	500	1.7	14	CL	50	5.00	1.20	22	0.24	0.15	0.99	0.31	0.88	1.00	0.35	-
B-4	6.5	15	m	n	o2	0.75	0.65	1.0	1.33	1.15	10	8	125	812.5	813	1.6	15	SC	23	4.06	1.10	21	0.22	0.16	0.98	0.31	0.88	1.00	0.35	-
B-4	11.5	6	m	n	o2	0.8	0.65	1.0	1.33	1.15	4	8	125	1437.5	1219	1.3	5	SM-SC	44	5.00	1.20	11	0.12	0.07	0.97	0.36	0.88	1.00	0.41	**0.30**
B-4	13.0	5	SPT	n	o2	0.8	1	1.0	1.33	1.15	5	8	125	1625	1313	1.2	7	SM-SC	44	5.00	1.20	13	0.14	0.09	0.97	0.37	0.88	1.00	0.43	**0.34**
B-4	16.5	13	m	n	o2	0.85	0.65	1.0	1.33	1.15	10	8	125	2062.5	1532	1.1	11	CL-CH	50	5.00	1.20	18	0.19	0.12	0.96	0.40	0.88	1.00	0.46	**0.42**
B-4	21.5	24	m	n	o2	0.95	0.65	1.0	1.33	1.15	20	8	125	2687.5	1845	1.0	21	CL-CH	79	5.00	1.20	30	-	0.23	0.95	0.43	0.88	1.00	0.49	-
B-4	26.0	50	m	n	o2	0.95	0.65	1.0	1.33	1.15	41	8	125	3250	2127	1.0	40	SW-SC	9	0.56	1.02	41	-	0.12	0.94	0.45	0.88	1.00	0.51	-
B-4	31.5	37	m	n	o2	0.95	0.65	1.0	1.33	1.15	30	8	125	3937.5	2471	0.9	27	CL	50	5.00	1.20	37	-	0.34	0.92	0.46	0.88	0.96	0.54	-
AB-B-11	2.0	12	SPT	y	rs	0.75	1	1.2	1.00	1.00	10	8	125	250	250	1.7	18	CL	50	5.00	1.20	27	0.33	0.19	1.00	0.31	0.88	1.00	0.35	-
AB-B-11	5.0	23	SPT	y	rs	0.75	1	1.2	1.00	1.00	22	8	125	625	625	1.7	37	CL	50	5.00	1.20	49	-	-0.06	0.99	0.31	0.88	1.00	0.35	-
AB-B-11	7.5	16	SPT	y	rs	0.75	1	1.2	1.00	1.00	14	8	125	937.5	938	1.5	21	CL	50	5.00	1.20	30	-	0.23	0.98	0.31	0.88	1.00	0.35	-
AB-B-11	10.0	28	SPT	y	rs	0.8	1	1.3	1.00	1.00	29	8	125	1250	1125	1.3	38	SM	23	4.06	1.10	46	-	0.03	0.98	0.34	0.88	1.00	0.39	-
AB-B-11	15.0	16	SPT	y	rs	0.85	1	1.2	1.00	1.00	16	8	125	1875	1438	1.2	19	SM	23	4.06	1.10	25	0.29	0.20	0.97	0.39	0.88	1.00	0.45	**0.65**
AB-B-11	20.0	20	SPT	y	rs	0.95	1	1.2	1.00	1.00	23	8	125	2500	1751	1.1	25	CL	50	5.00	1.20	35	-	0.29	0.95	0.42	0.88	1.00	0.48	-
AB-B-11	25.0	27	SPT	y	rs	0.95	1	1.3	1.00	1.00	33	8	125	3125	2064	1.0	32	CL	50	5.00	1.20	43	-	0.73	0.94	0.44	0.88	1.00	0.51	-
AB-B-11	30.0	35	SPT	y	rs	0.95	1	1.3	1.00	1.00	43	8	125	3750	2377	0.9	40	CL	50	5.00	1.20	53	-	0.12	0.93	0.46	0.88	0.97	0.54	-
AB-B-11	35.0	37	SPT	y	rs	1	1	1.3	1.00	1.00	48	8	125	4375	2690	0.9	41	CL	50	5.00	1.20	54	-	0.16	0.89	0.45	0.88	0.94	0.55	-
AB-B-11	40.0	31	SPT	y	rs	1	1	1.3	1.00	1.00	40	8	125	5000	3003	0.8	33	CL	50	5.00	1.20	45	-	1.24	0.85	0.44	0.88	0.92	0.55	-

ATTACHMENT E.2

CLiq Liquefaction Results

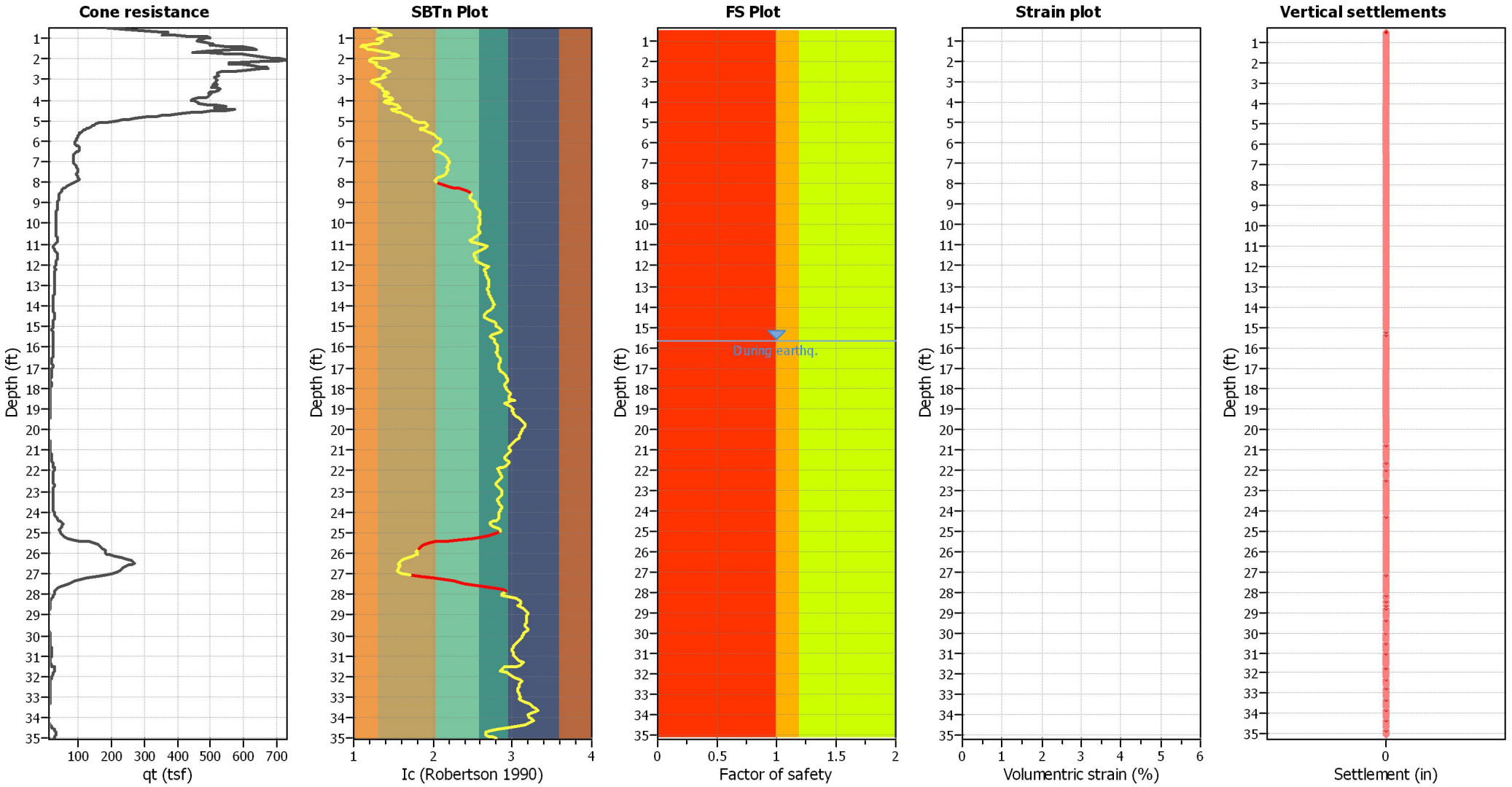
Estimation of liquefaction-induced ground settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

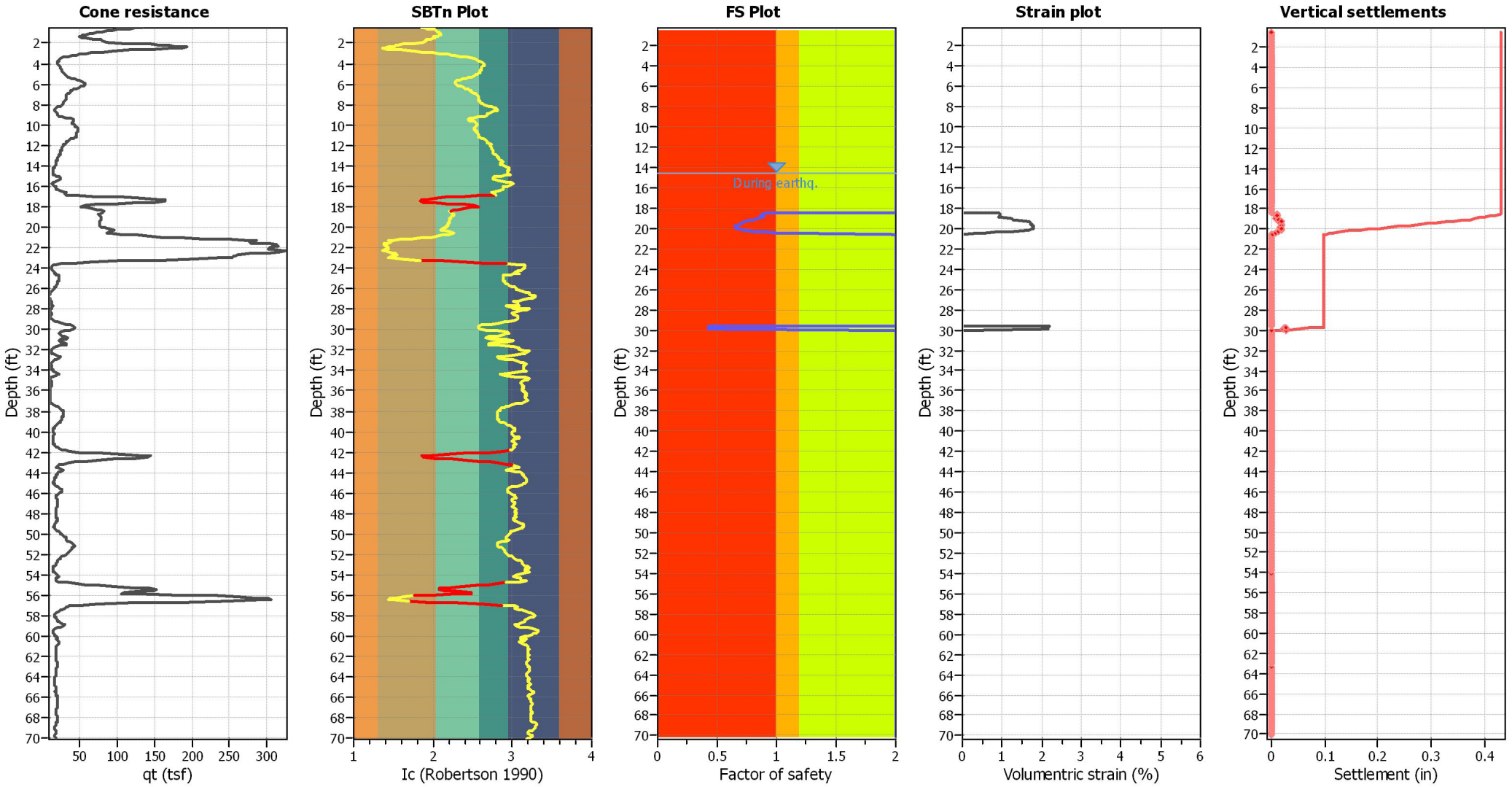
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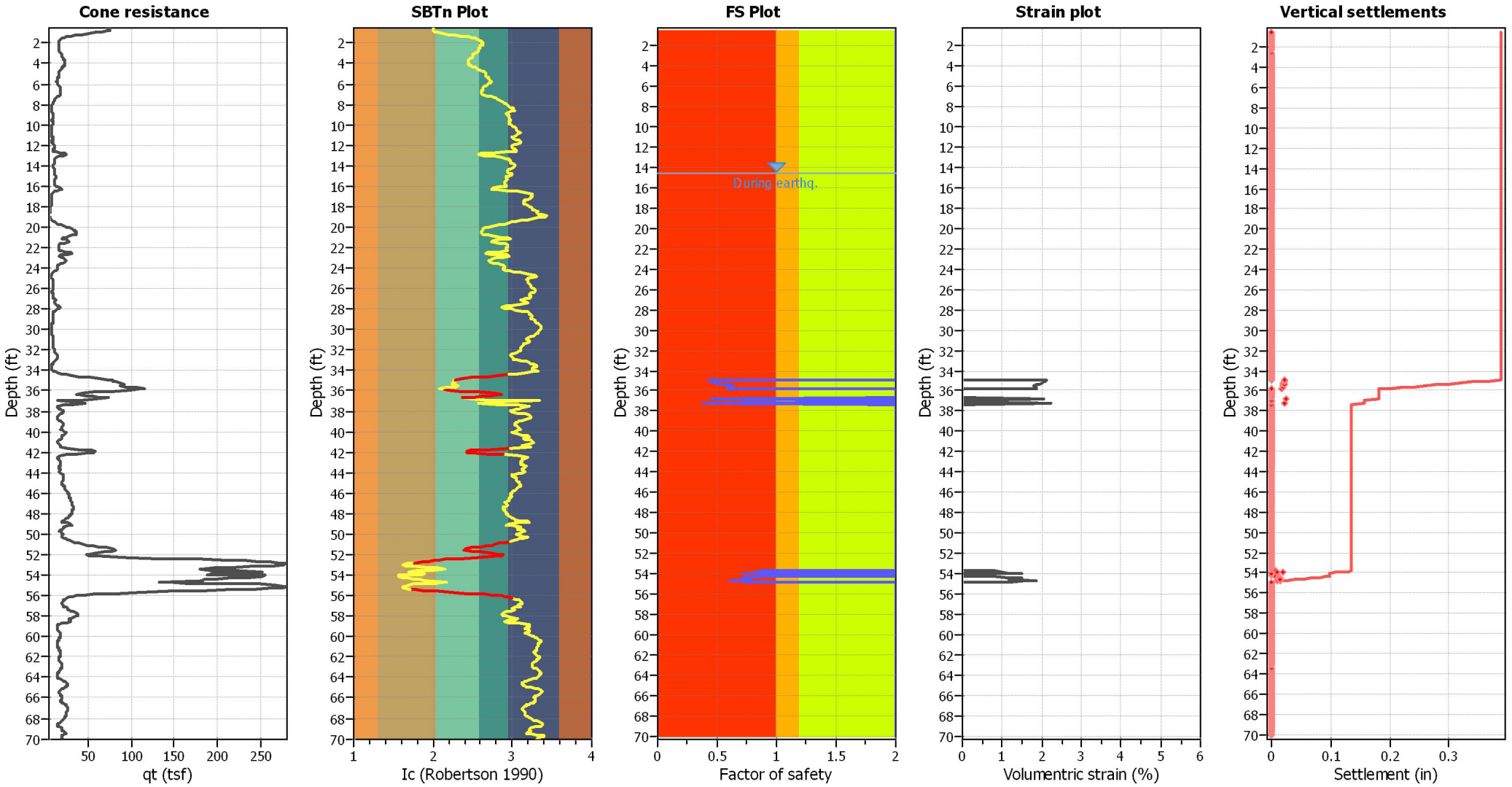
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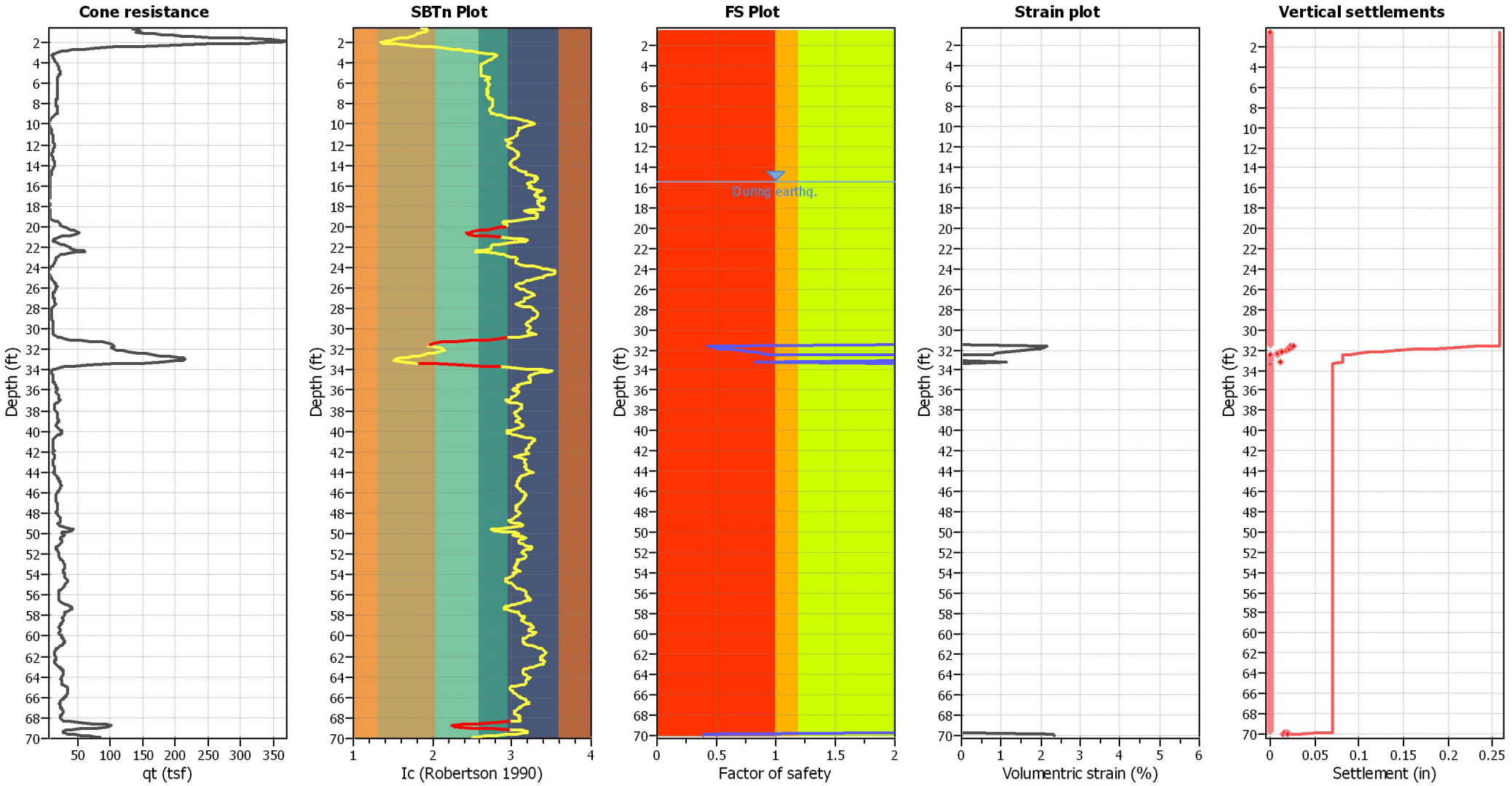
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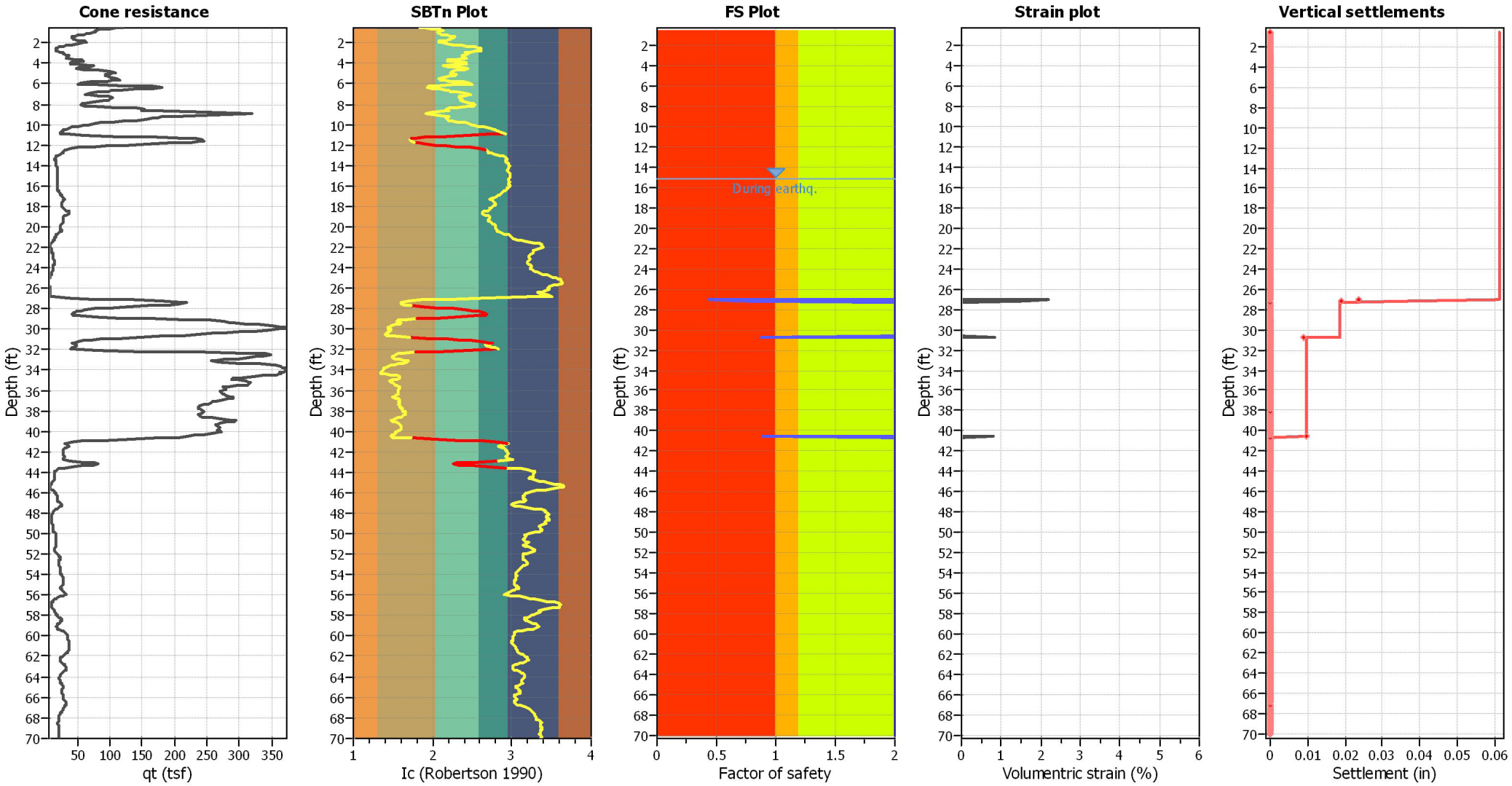
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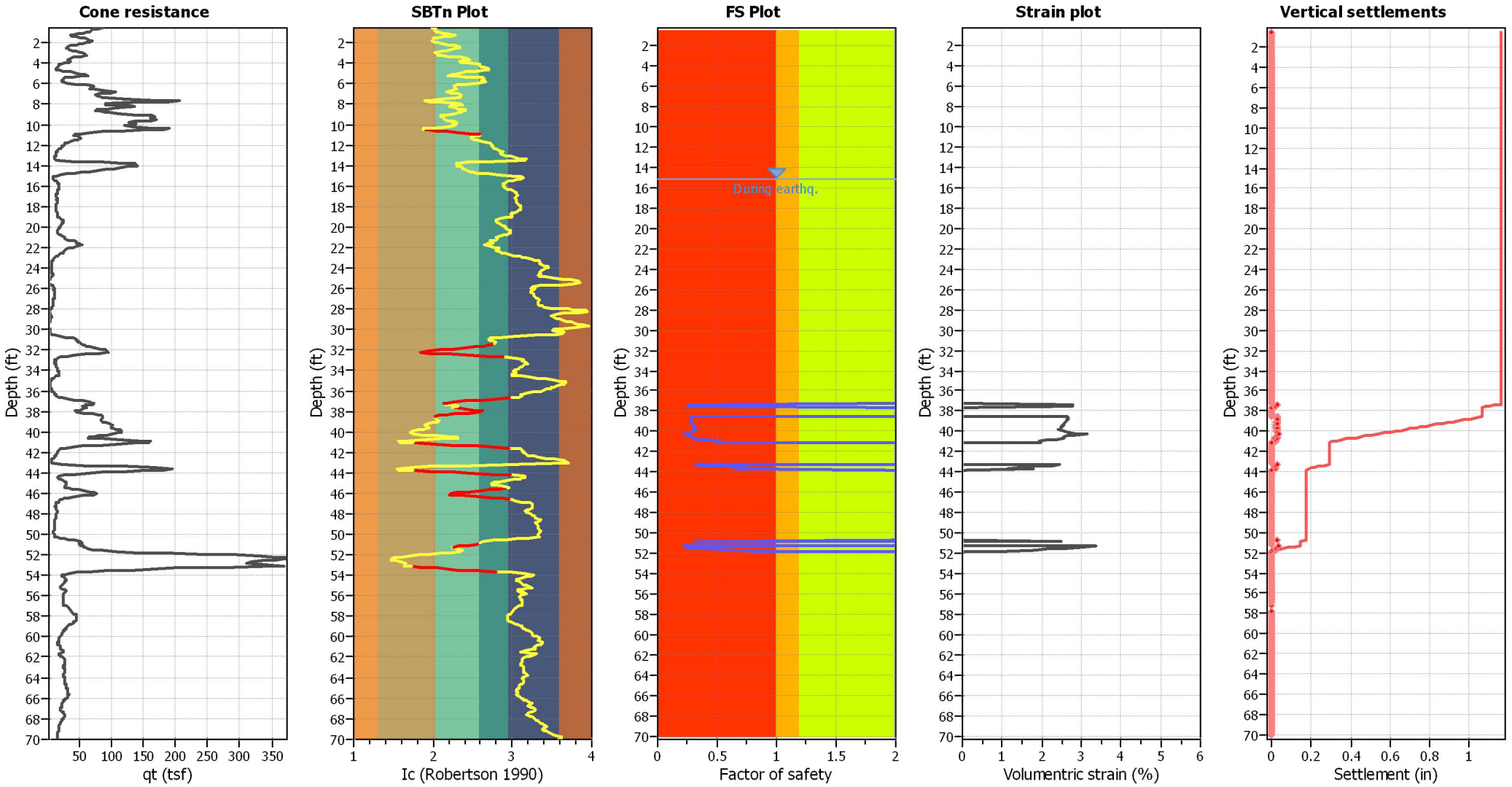
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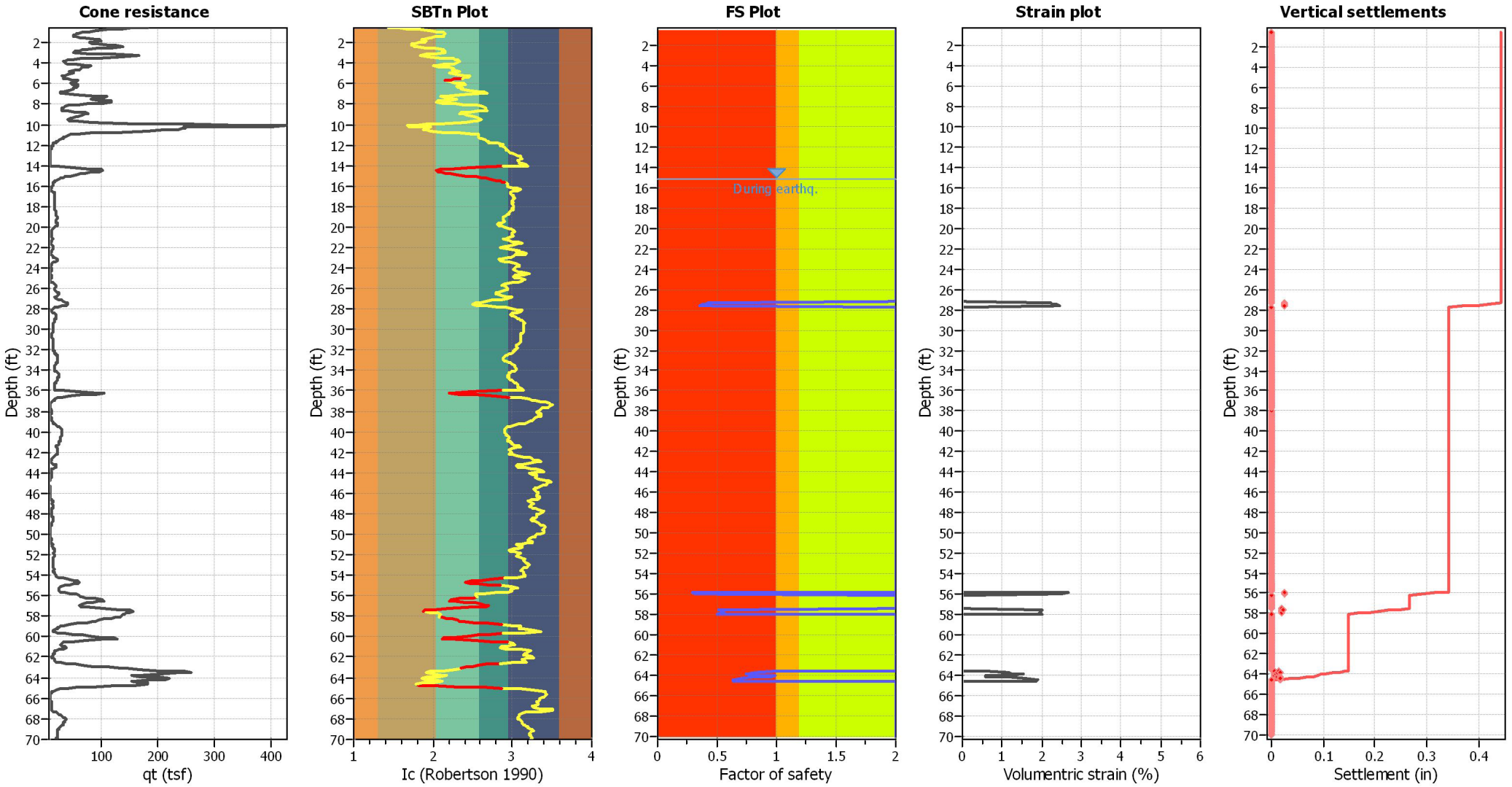
Estimation of liquefaction-induced ground settlements



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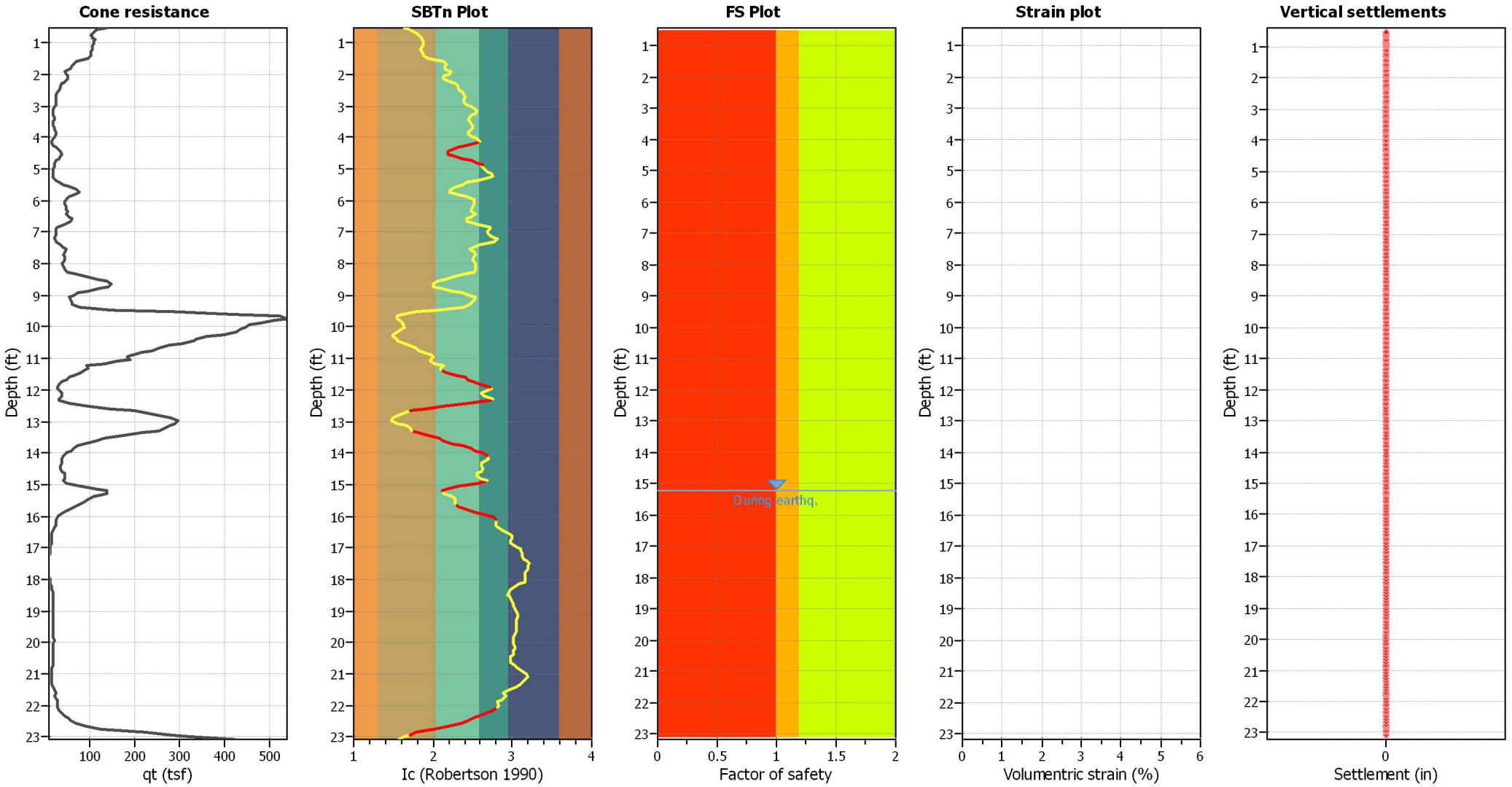
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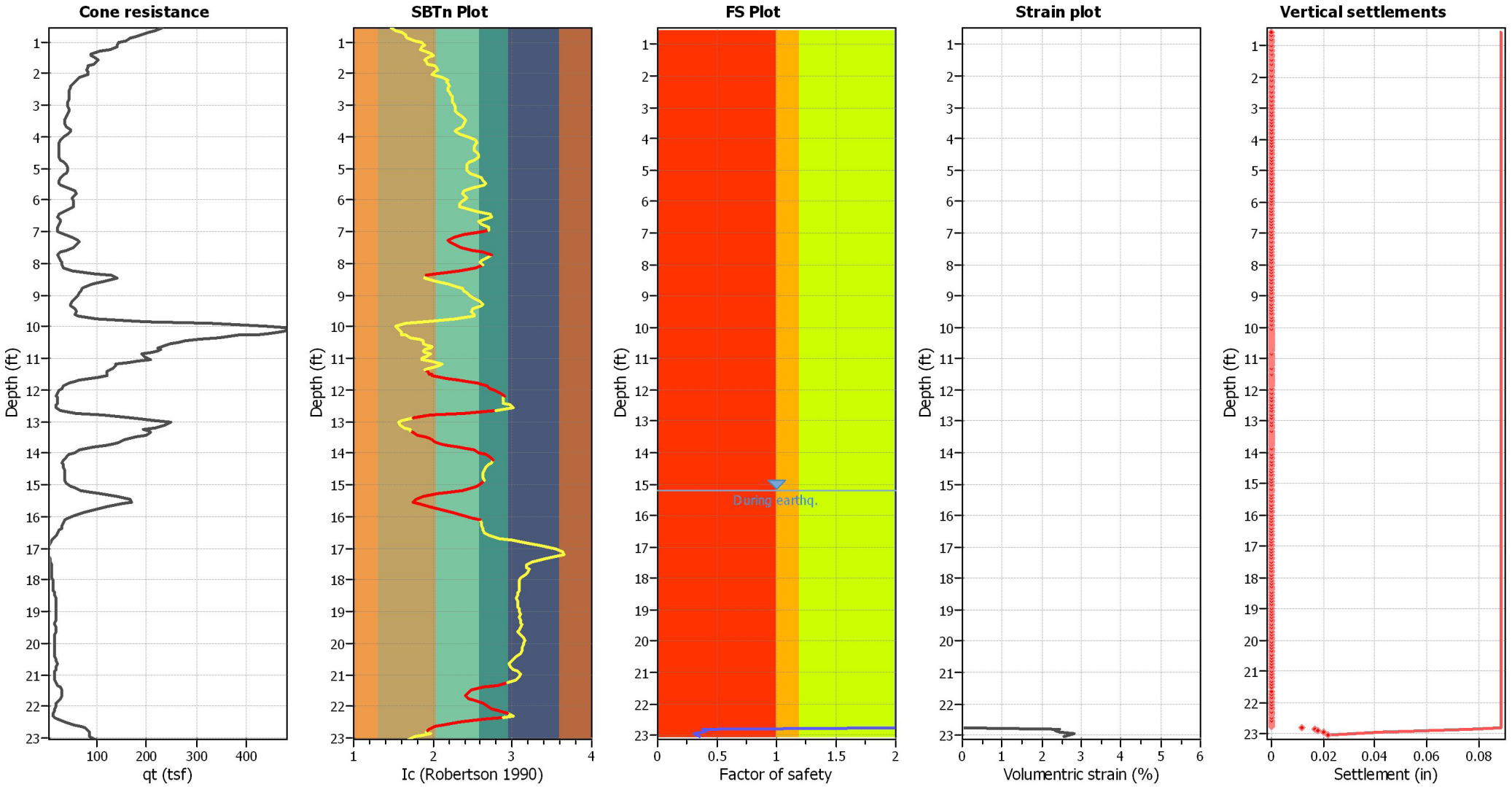
Estimation of liquefaction-induced ground settlements



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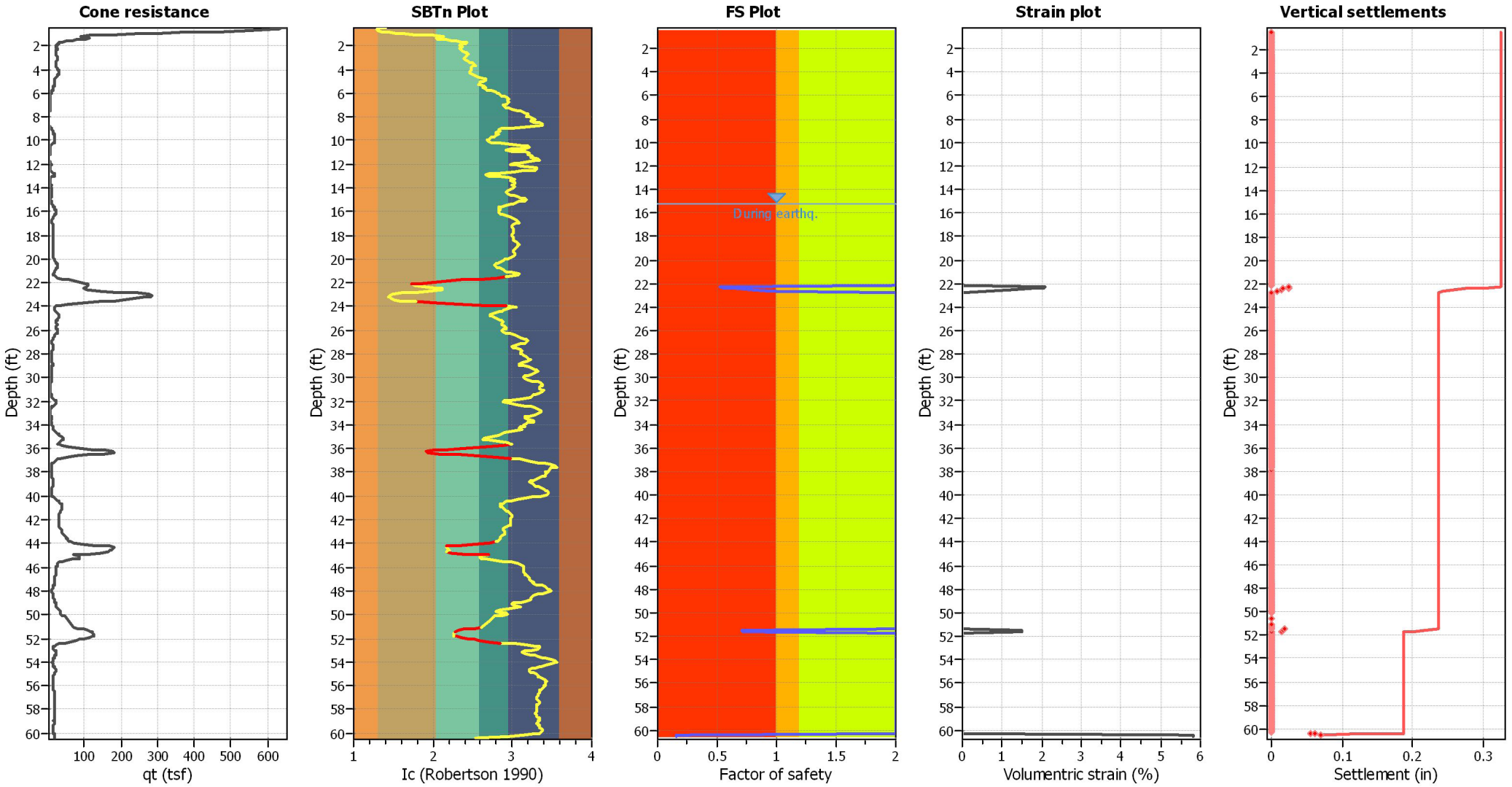
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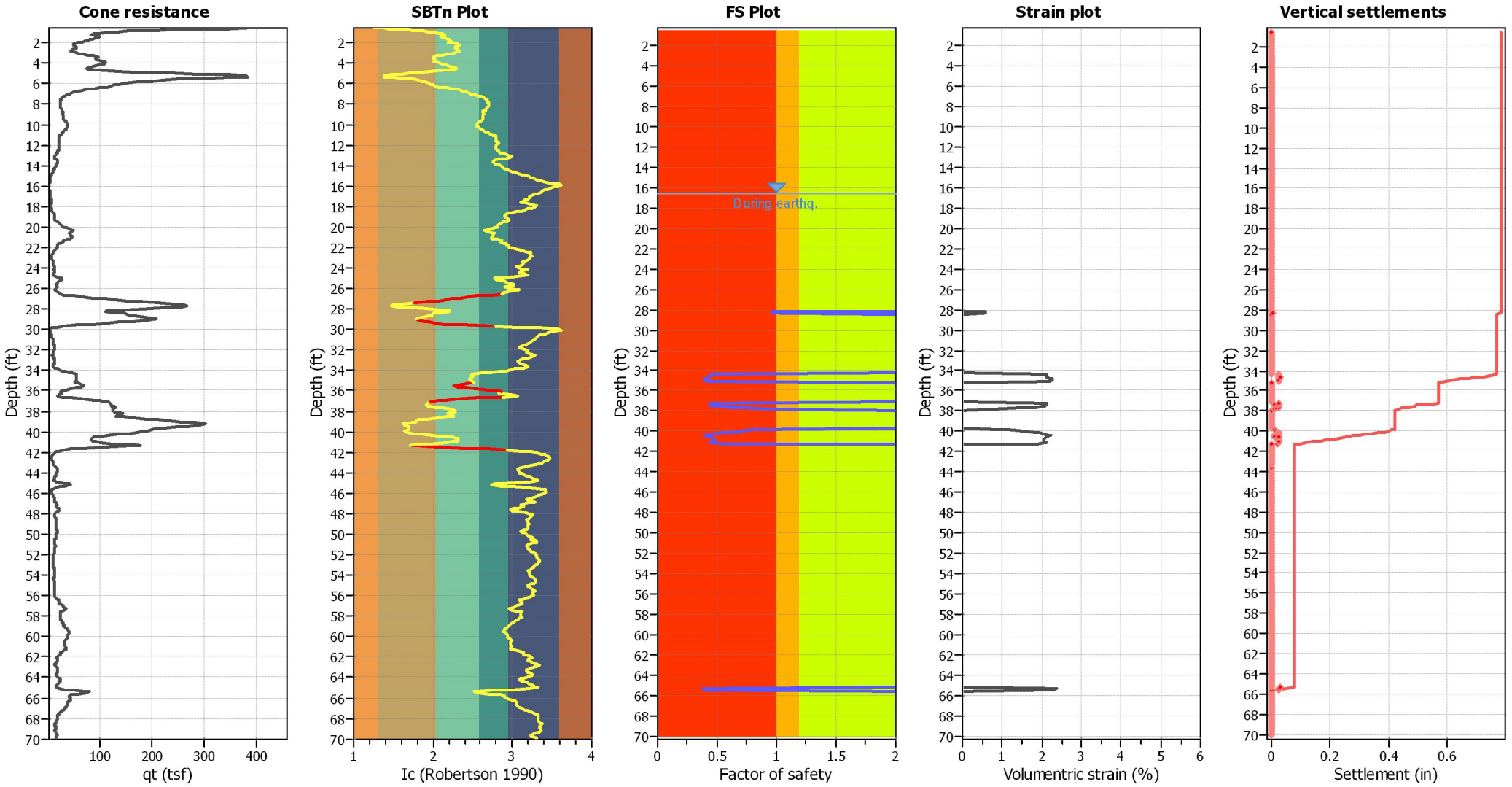
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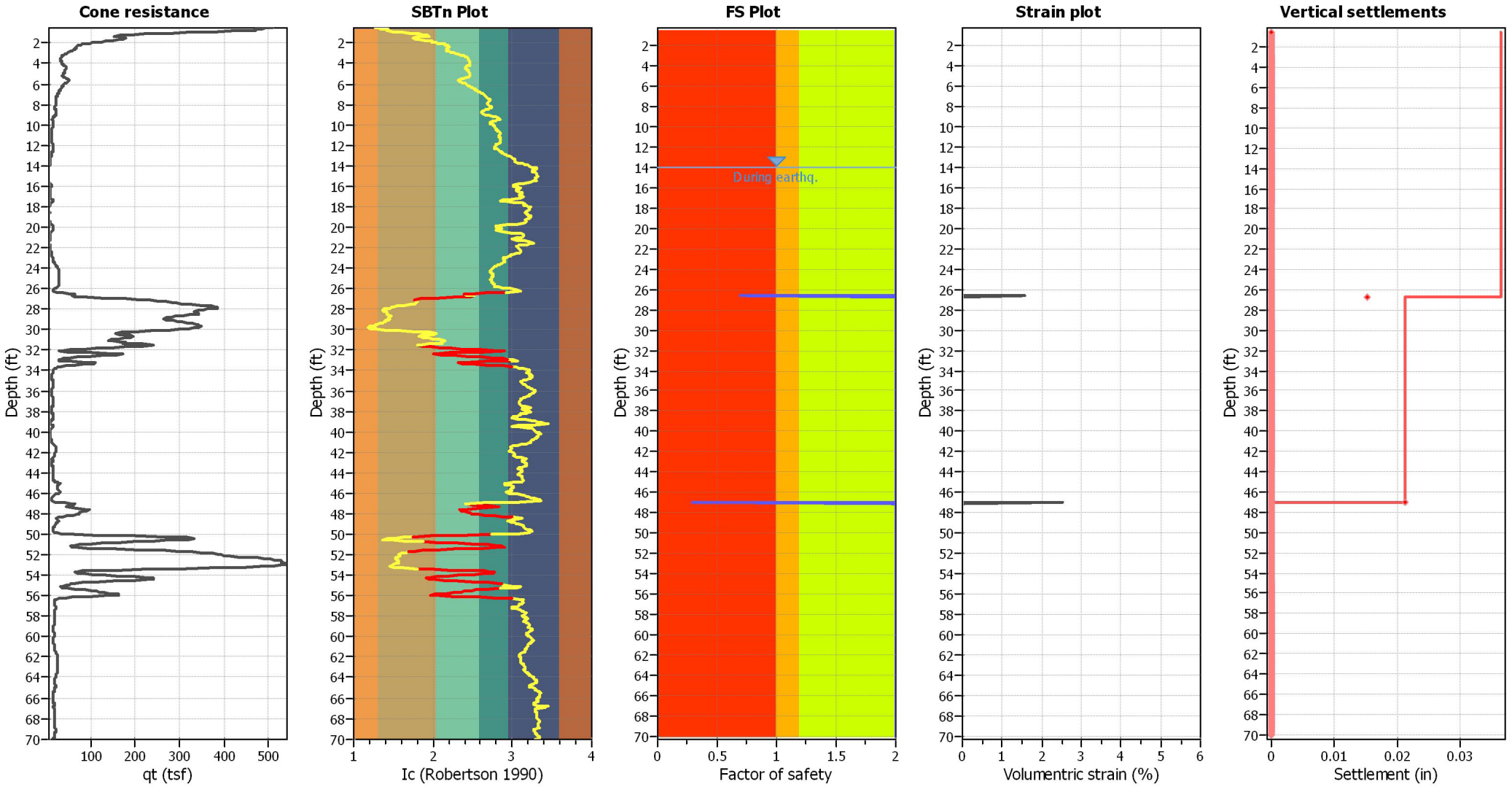
Estimation of liquefaction-induced ground settlements



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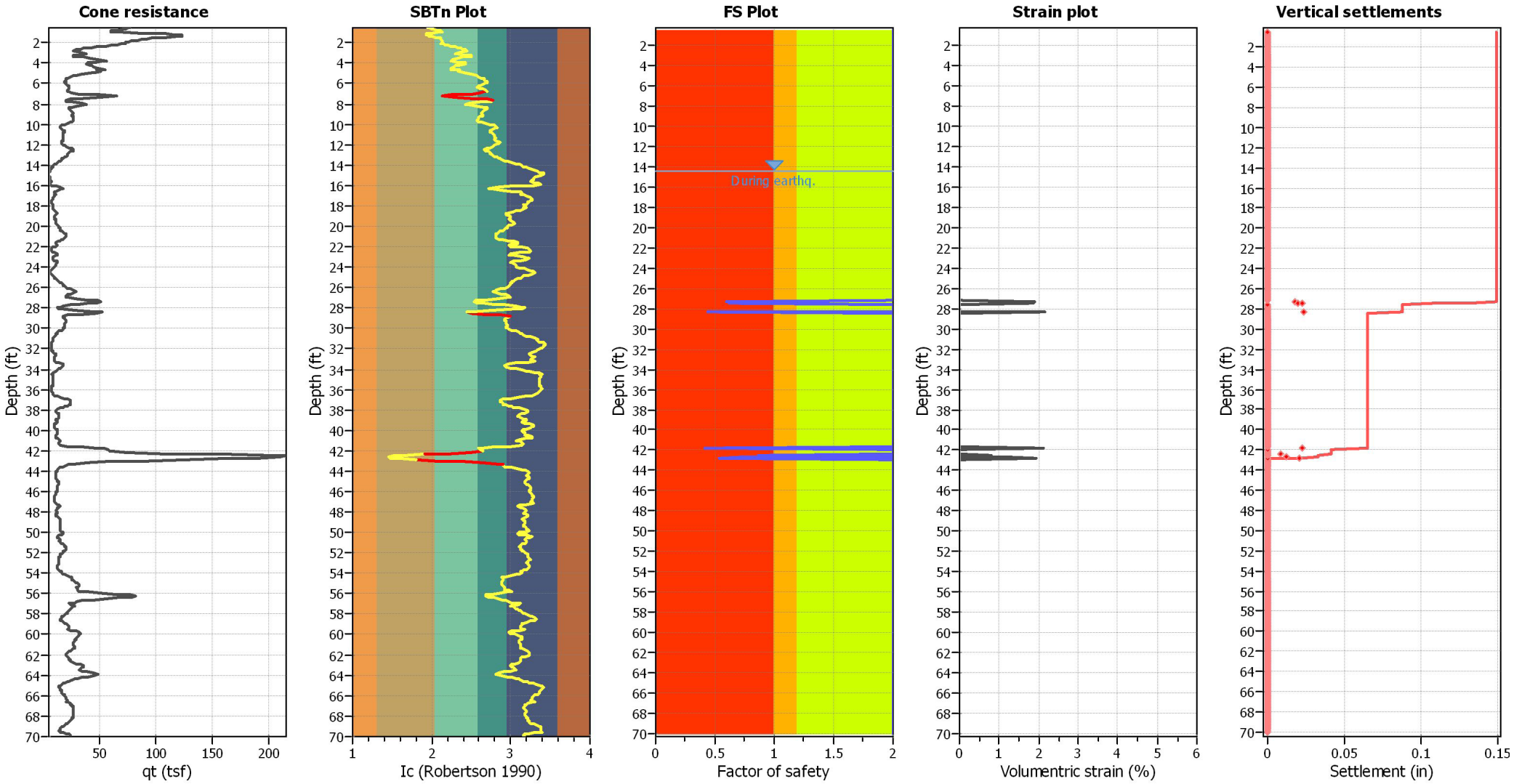
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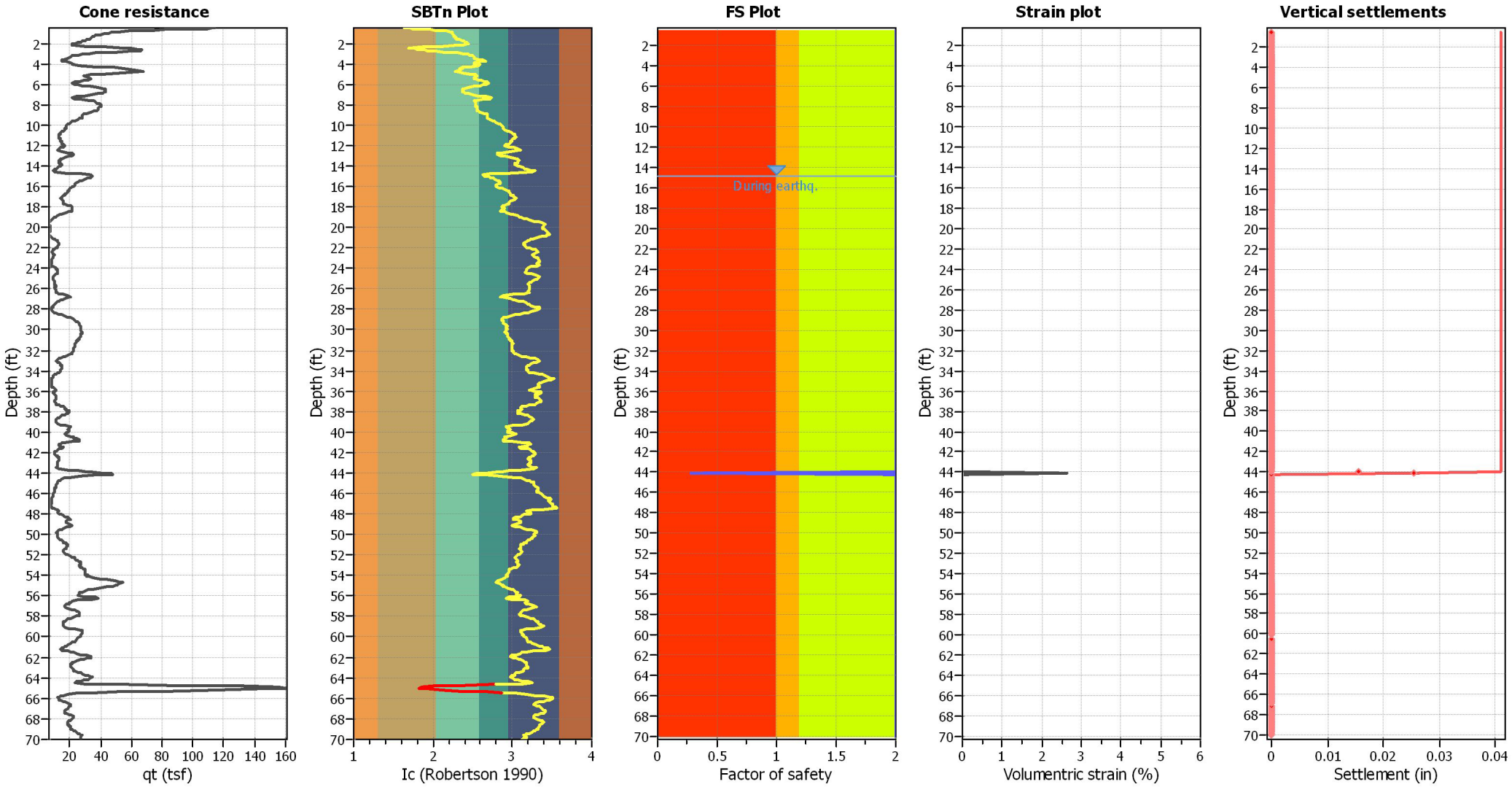
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FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

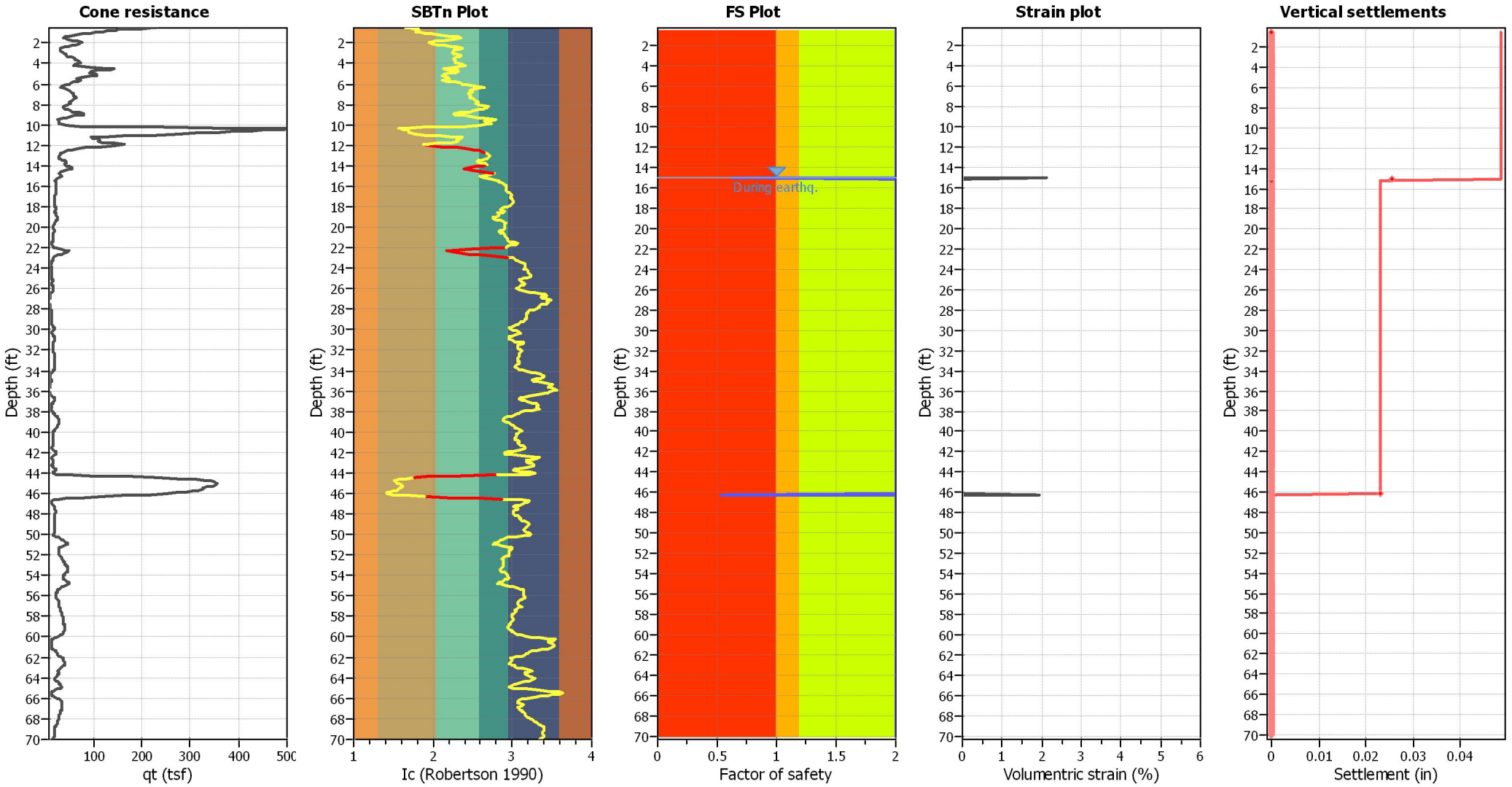
Estimation of liquefaction-induced ground settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

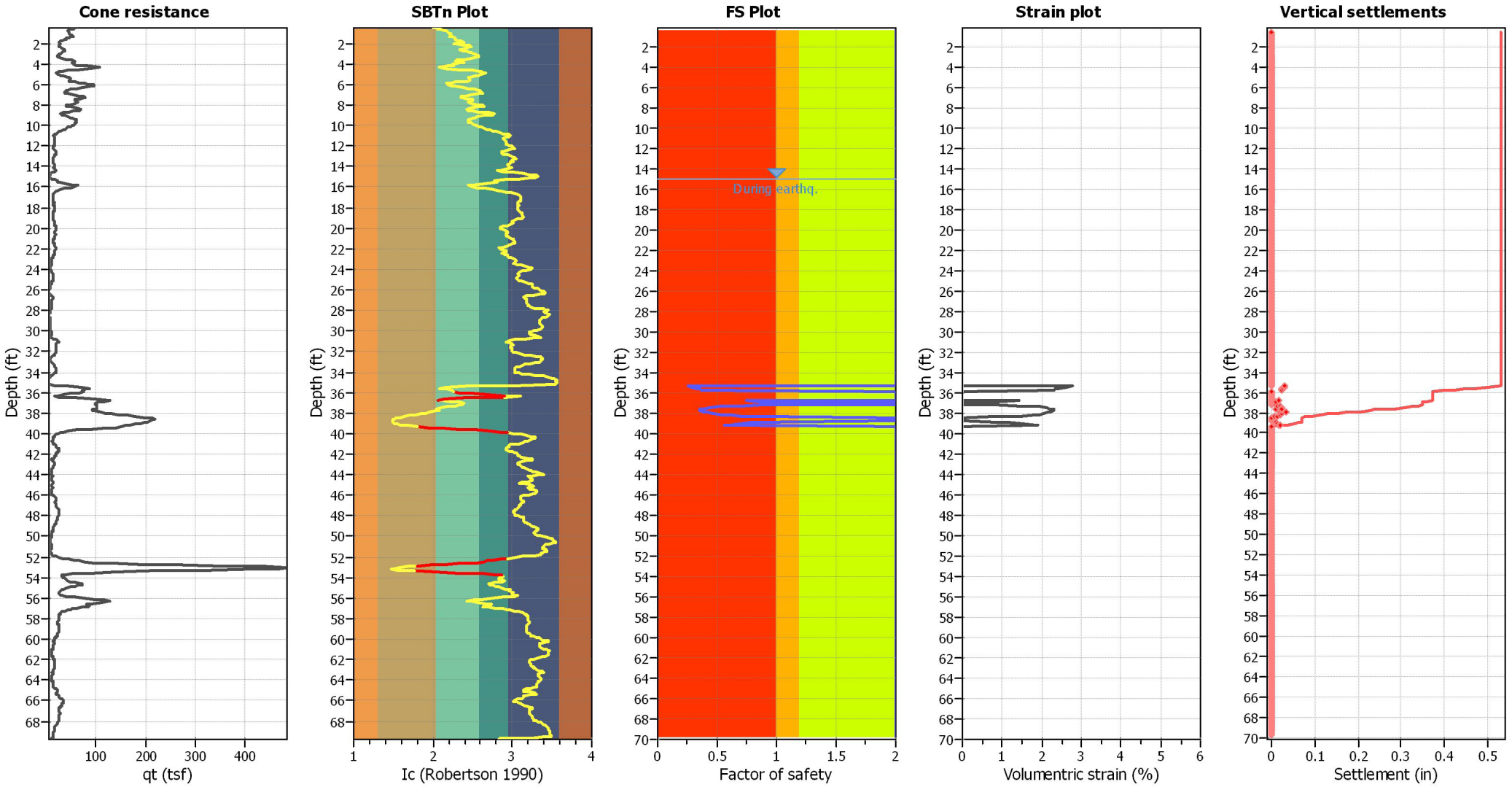
Estimation of liquefaction-induced ground settlements



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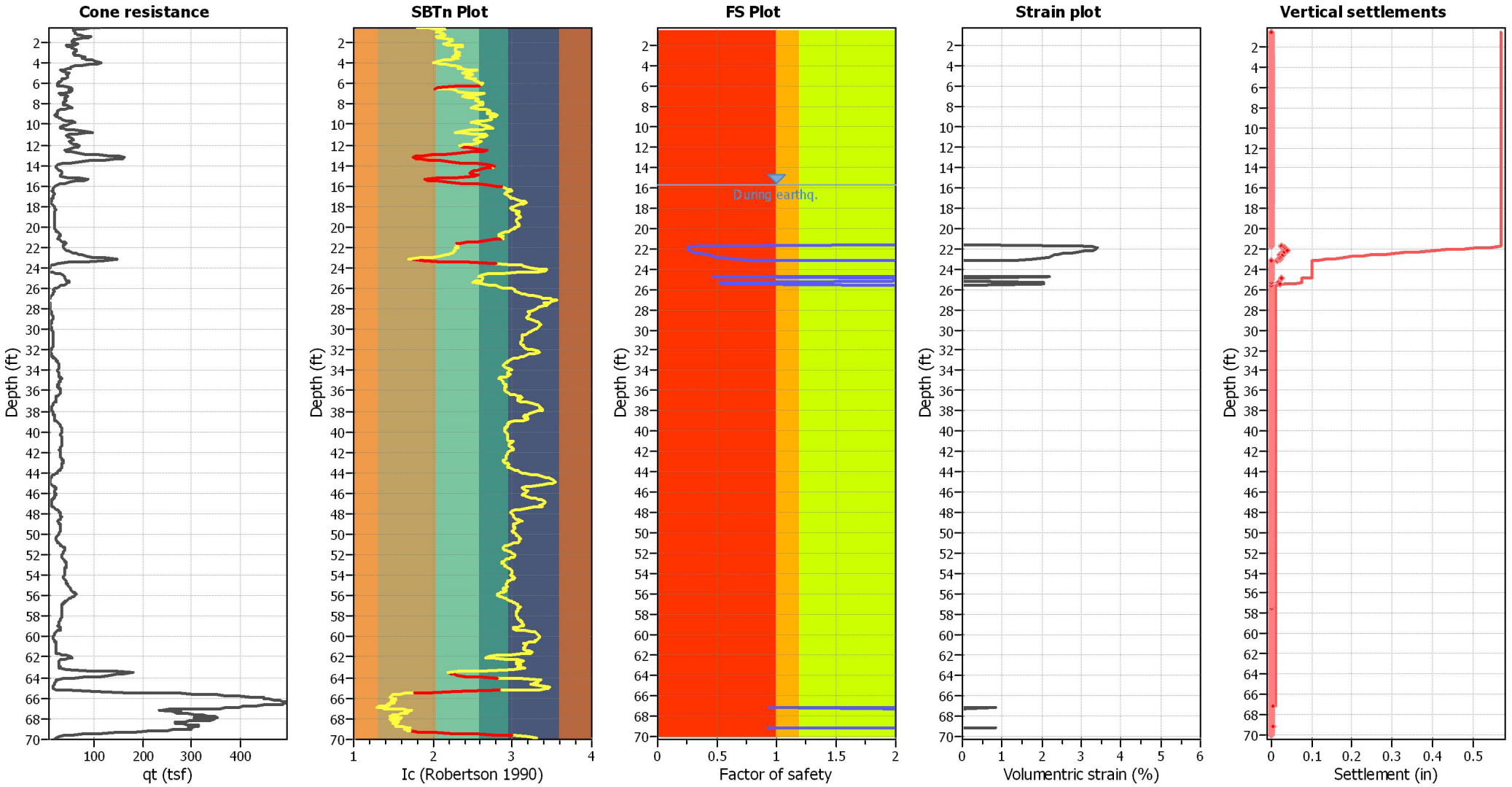
Estimation of liquefaction-induced ground settlements



Abbreviations

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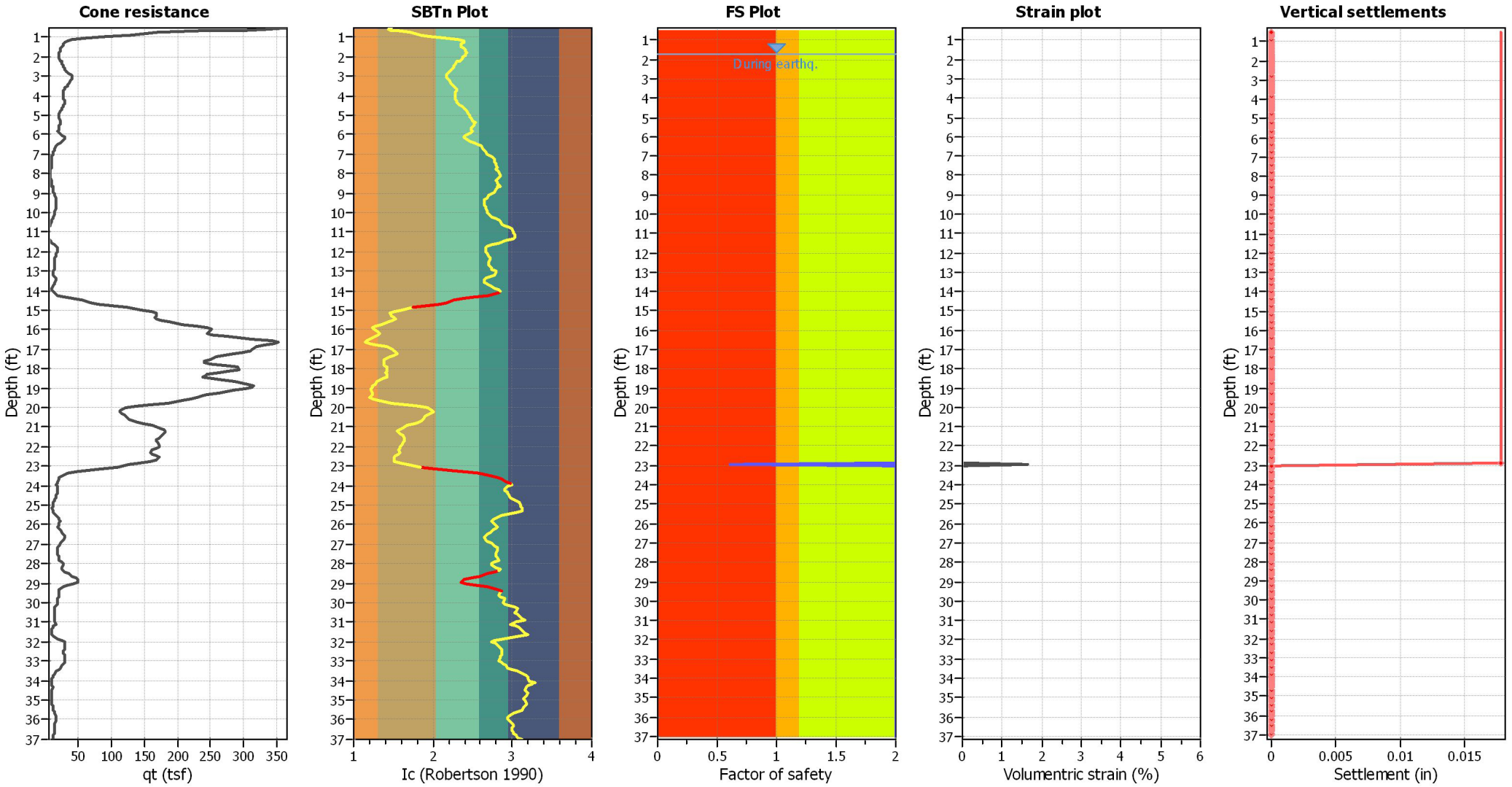
Estimation of liquefaction-induced ground settlements



Abbreviations

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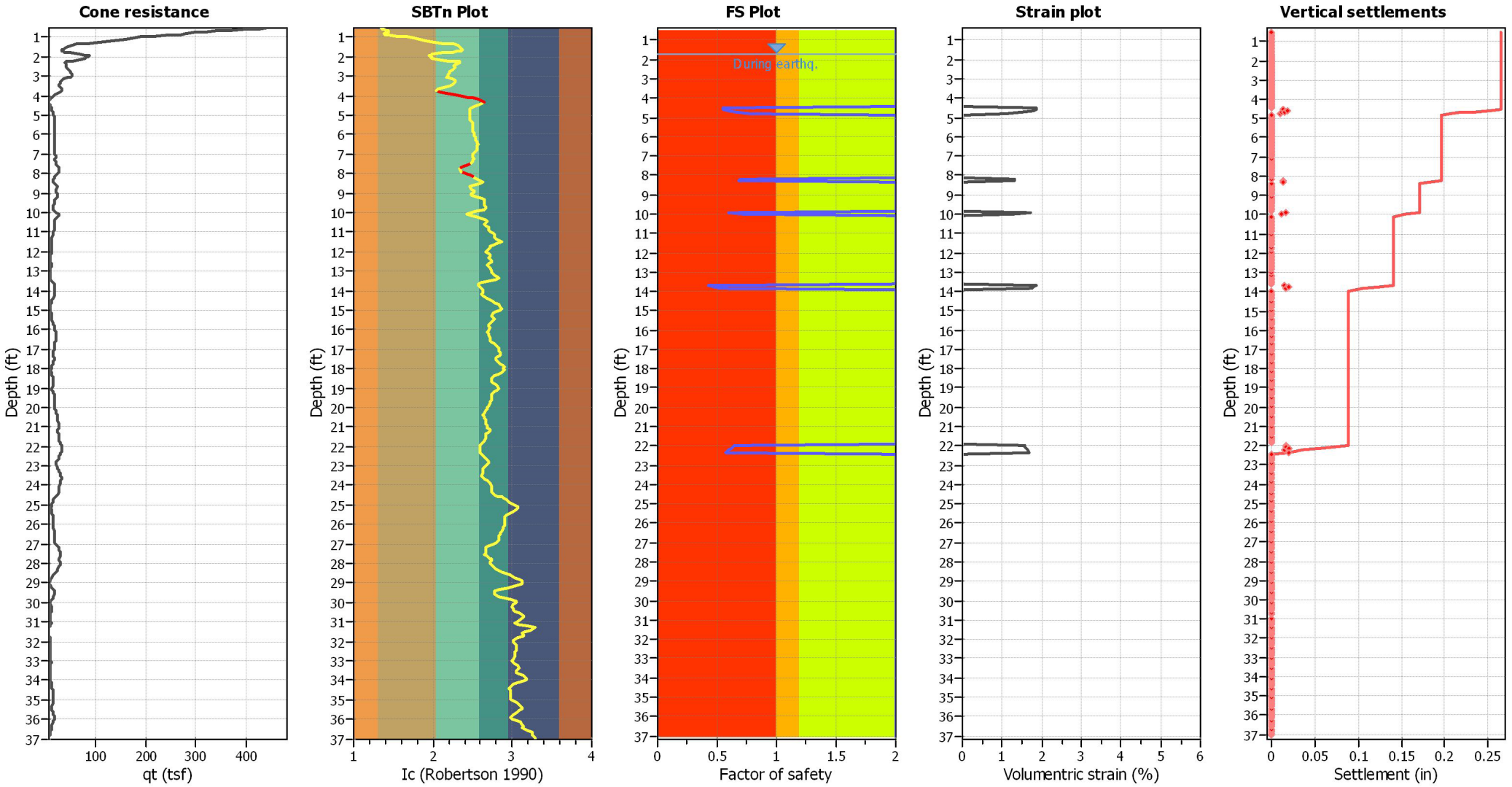
Estimation of liquefaction-induced ground settlements



Abbreviations

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Estimation of liquefaction-induced ground settlements

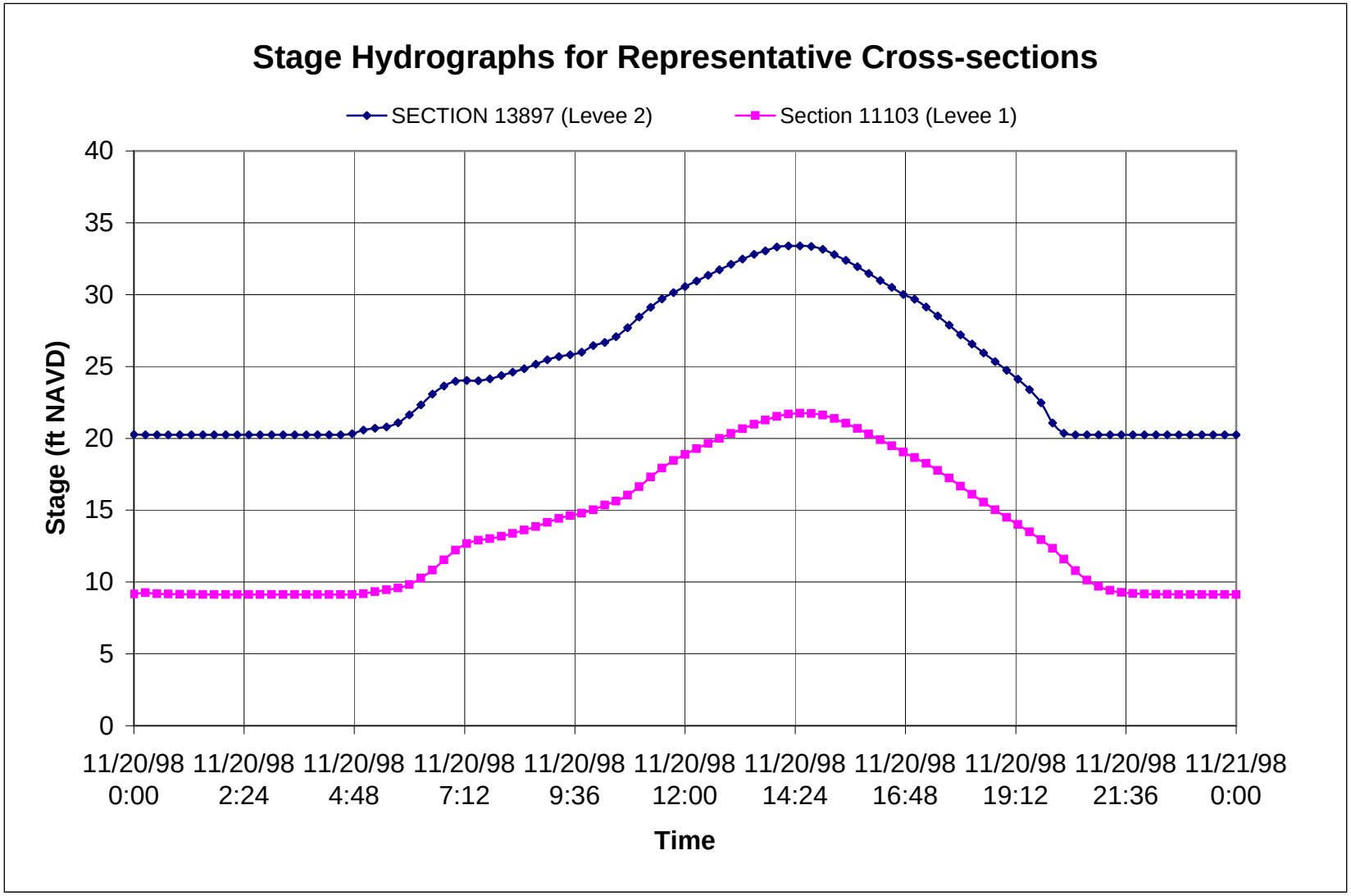


Abbreviations

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APPENDIX F

Stevens Creek Design Flood Stage and Hydrographs


Stage Hydrographs for Representative Cross-sections
SECTION 13897 (Levee 2)
Section 11103 (Levee 1)
Stage (ft NAVD)
40
35
30
25
20
15
10
5
0
11/20/98 0:00
11/20/98 2:24
11/20/98 4:48
11/20/98 7:12
11/20/98 9:36
11/20/98 12:00
11/20/98 14:24
11/20/98 16:48
11/20/98 19:12
11/20/98 21:36
11/21/98 0:00
Time